World Congress on Nature and Biologically Inspired Computing (NaBIC'09)

&

8th International Conference on Computer Information Systems and Industrial Management Applications

(CISIM 2009)

PSG College of Technology, Coimbatore, India
Dec 09-11, 2009

Nurturing Nature and Biologically Inspired
Computing for the advancement of Machine Intelligence

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Machine Intelligence Research Labs (MIR Labs)

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Welcome from NaBIC 2009 Chairs

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Welcome to the World Congress on Nature and Bio inspired computing (NaBIC 2009) and the 8th International Conference on Computer Information Systems and Industrial Management Applications (CISIM 2009) jointly to be held at PSG College of Technology, Coimbatore, India, one of the premier technological institutes in the country. As a premier conference in the world, NaBIC 2009 covers a wide range of topics related to Bio inspired computing. The aim is to build a 3 day platform where researchers /academicians /engineers from diverge regions of the world would converge to share their ideas and explorations in the field of Machine Intelligence and Computer Information Systems. The theme for this symposium "Nurturing Intelligent Computing Towards Advancement of Machine Intelligence" reflects the need of the hour.

 The conference starts off with tutorials and we are fortunate to have several well known authorities to deal in depth with issues related to the conference theme. We are also blessed with the presence of renowned plenary speakers and invitees who are luminaries in their respective fields. We are sure you will find their talks inspiring and insightful.

We truly hope that you have a technically rewarding experience as well as cherishable memories in this ancient and exciting city of Coimbatore.

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NaBIC - CISIM '09

Welcome to the World Congress on Nature and Biologically Inspired Computing (NaBIC'09). The Three Day Congress held during Dec 09-11, 2009 at PSG College of Technology, Coimbatore, India has been organized to discuss the state-of-the-art as well as to address various issues with respect to building up of computers in man's image. The theme for NaBIC 2009 is *"Nurturing Intelligent Computing Towards Advancement of Machine Intelligence"*.

NaBIC 2009 will provide an excellent opportunity for scientists, academicians and engineers to present and discuss the latest scientific results and methods. The conferences include keynote addresses, contributed papers, organized workshops and numerous lectures.

The papers were solicited in the following areas for NaBIC 2009:

- Artificial Neural Networks
- Biodegradability Prediction
- Cellular Automata
- Evolutionary Algorithms
- Swarm Iintelligence
- Emergent Systems
- Artificial Life
- Lindenmayer Systems
- Digital Organisms
- Artificial Immune Systems
- Membrane Computing
- Simulated Annealing
- Communication Networks and Protocols
- Computing with Words
- Common Sense Computing
- Cognitive Modeling and Architecture
- Connectionism
- Metaheuristics
- Hybrid Approaches
- Quantum Computing
- Nano Computing
- Industrial Applications of Nature and Biologically Inspired Computing

The aim is to bring together worldwide leading researchers, developers, practitioners and educators interested in advancing the state of the art in *Nature and Biologically Inspired Computing* for exchanging knowledge that encompasses a broad range of disciplines among various distinct communities. It is hoped that researchers will bring new prospect for collaboration across disciplines and gain ideas facilitating novel breakthroughs.

The conference will provide an exceptional platform to the researchers to meet and discuss the utmost solutions, scientific results and methods in solving intriguing problems with people who have been actively involved in these evergreen fields. The 3-day conference will feature prominent keynote lectures, panel discussions, and paper presentations in parallel tracks. NaBIC 2009 has attracted numerous submissions. Besides, special sessions and focused workshops, the following International Symposiums are also held in conjunction with NaBIC 2009 at various venues in India:

- Innovations in Natural Computing (INC2009)
- Bio-inspired Computing and Applications (BICA 2009)
- 8th international Conference on Computer Information Systems and Industrial Management Applications (CISIM 2009)
- Doctoral Student Symposium

Following are the statistics related to the total number of submissions and acceptance of papers.

- NaBIC 2009 received 319 submissions and 144 papers were accepted as full papers
- CISIM 2009 received 105 submissions and 31 papers were accepted as full papers
- INC 2009 received 82 submissions and 24 papers were accepted.
- BICA 2009 received 111 submissions and 60 papers were accepted.

In total, we have received 617 contributions from more than 40 countries namely Egypt, Kuwait, Indonesia, Norway, Bangladesh, Mexico, Saudi Arabia, Thailand, Finland, Croatia, Greece, South Africa, Sri Lanka, Slovakia, Germany, Portugal, Czech Republic, Canada, France, Spain, Romania, Tunisia, Algeria, Italy, Brazil, United States, Japan, United Kingdom, China, Malaysia, Iran, Iceland, Syria, Russia, West Indies, Nepal, Poland, South Korea, Australia, New Zealand, Turkey, Ethopia and India. Each paper was sent to at least 5 reviewers from our International Program Committee in a standard peer-review evaluation. The accepted papers based on the reviews were shaped into two categories: regular papers of 6 pages and short papers of 4 pages. The accepted papers spanned a wide spectrum of fundamental and application areas.

NaBIC 2009 is organized by Machine Intelligence Research Labs (MIR Labs) and Technically sponsored/supported by IEEE Region 10, IEEE India Council, IEEE Madras chapter, IEEE Systems, Man and Cybernetics Society Technical Committee on Soft Computing, International Fuzzy Systems Association (IFSA) and International Neural Network Society (INNS). Many people have collaborated and worked hard to make NaBIC 2009 a success. First and foremost, we would like to thank all the authors for submitting their papers to the conference, for their presentations and discussions during the conference. Our thanks to Program Committee members and reviewers, who carried out the most difficult work by carefully evaluating the submitted papers.

Under the NaBIC 2009 umbrella, we have organized nearly 20 plenary and invited talks. We would like to thank the local organizing committee from PSG College of Technology, Coimbatore, India for all the wonderful organization.

We wish all NaBIC 2009 delegates an excited meeting and a pleasant stay. Enjoy the Congress!

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December 08-11, Coimbatore, India

Technical Programme

December 08, 2009

One Day Pre conference Tutorials and Doctoral Symposium

Tutorials (to be held in three parallel streams)

Time: 9.30 to 15:30

Stream A : **Content-based image retrieval: techniques, challenges and recent developments**
Gerald Schaefer   Loughborough University, UK

Stream B : **Web Content Mining**
Vaclav Snasel   VSB-Technical University of Ostrava, Czech Republic

Stream C : **Evolutionary Multi-Objective Optimization**
Mario Koeppen,   Kyushu Institute of Technology, Japan

Doctoral Symposium: 9:30 to 11:00   Venue: Y301

December 09, 2009

07:30 - 8:30	Registration and Breakfast				
8:30 – 9:00	NaBIC 2009 – CISIM 2009 Opening Ceremony				
9:00 – 10:00	**PL1: Plenary Talk** *David Corne* *Heriot-Watt University, UK*				
10:00 -11:00	**PL2: Plenary Talk** *Hendrik Ritcher* *Leipzig University of Applied Sciences, Germany*				
11:00 – 11:15	Coffee Break				
11:15 – 12:00	**PL3: Plenary Talk** *Kamala Kritivasan* *Indian Institute of Technology Madras, India*				
12:00 – 13:00	**PL4: Plenary Talk** *Mario Koeppen* *Kyushu Institute of Technology, Japan*				
13:00 - 14:00	Lunch				
14.00-15.00	**PL5: Plenary Talk** *Gauri Mittal* *University of Guelph, Canada*				
15:00 - 17:00	NaBIC SS1	NaBIC SS2	NaBIC SS3	NaBIC SS4	**Invited Talk -1** *Gerald Schaefer Loughborough University UK* CISIM SS1
17:00 - 17:15	Coffee Break				
17:15 – 17.45	NaBIC – CISIM Poster Sessions				
17.45 - 19:30	NaBIC SS5	NaBIC SS6	NaBIC SS7	NaBIC SS8	CISIM SS2
19:30 - 20:30	Cultural Programme (Indian Traditional Dance)				
20.30 – 21.30	Dinner				

NaBIC - CISIM '09

December 10, 2009

8:00 – 9:00	Registration and Breakfast
9:00 – 10:00	**Panel Discussion** - *Machine Intelligence and NABIC -Trends and Future Directions - Experts Speak!* **Moderator:** *Ajith Abraham*
10:00 – 11:00	**PL6: Plenary Talk** *Hideyuki Takagi* *Kyushu University, Japan*
11:00 – 11:15	Coffee Break
11:15 – 12:00	**PL7: Plenary Talk** *Michal Wozniak* *Wroclaw University of Technology, Poland*
12:00 – 13:00	**PL8: Plenary Talk** *Dipankar Dasgupta* *University of Memphis, USA*
13:00 - 14:00	Lunch

14:00 - 16:00	NaBIC SS9	NaBIC SS10	NaBIC SS11	NaBIC SS12	**Invited Talk 2** *Siti Mariyam Shamsuddin Universiti Teknoligi Malaysia*
					CISIM SS3

16:00 - 16:30	Coffee Break
16:30 – 17:15	NaBIC – CISIM Poster Sessions

17:15 - 19:00	NaBIC SS13	NaBIC SS14	NaBIC SS15	NaBIC SS16	**Invited Talk 3** *Václav Snášel, VSB-Technical University of Ostrava, Czech Republic*
					CISIM SS4

19:00 – 21:00	Conference Banquet / Award Ceremonies

Plenary Talks   Venue: Assembly hall

December 11, 2009

08:00 – 9:00	Registration and Breakfast				
9:00 - 10:45	NaBIC SS17	NaBIC SS18	NaBIC SS19	NaBIC SS20	**Invited Talk 4** *Piotr Porwik* *University of Silesia,* *Poland*
					CISIM SS5
10:45 - 11:00	Coffee Break				
11:00 - 12:45	NaBIC SS21	NaBIC SS22		NaBIC SS23	**Invited Talk 5** *Clif Kussmaul* *Muhlenberg College* *USA*
					CISIM SS6
12:45 – 13:00	Closing Ceremony				
13:00-14:00	Lunch				
15:00	Transport to INC 2009, Cochin / Visit to Isha Yoga centre, Velliangiri Hills, Coimbatore				

NaBIC 2009   Session Schedules

NaBIC SS1   Neural Networks   Dec 09, 2009   15.00-16.30   Venue: EB Seminar Hall

An Enhanced Counter Propagation Neural Network for Abnormal Retinal Image Classification
Anitha J, Kezi Selva Vijila C and Jude Hemanth D.

Classification of fused images using radial basis function neural network for human face recognition
Mrinal Bhowmik, Debotosh Bhattacharjee, Mita Nasipuri and Mahantapas Kundu.

Modeling Spiking Neural P systems using Timed Petri nets
Venkata Padmavati Metta, Kamala Krithivasan and Deepak Garg.

Feature Selection for Human Resource Selection Based on Affinity Propagation and SVM Sensitivity
Analysis
Qiangwei Wang, Boyang Li and Jinglu Hu

NaBIC SS2   Swarm Intelligence and PSO   Dec 09, 2009 15.00-17.00   Venue: F201

Particle Swarm Optimization based Corrective Strategy to Alleviate Overloads in Power System
Manoj Kumar Maharana and Shanti Swarup K.

Syncro Germ Co-operation by Twin Swarm Intelligence for Multimodal Function Optimization
*Kamalakar Bakwad, Shyam Pattnaik, B.S. Sohi, Swapna Devi, B.K. Panigrahi, Sanjoy Das and M.R.
Lohokare.*

Fuzzy Controlled Harmonic Suppressor and Reactive Volt Ampere Compensator for Enhancing Power
Quality,IS01,Applied Swarm Intelligence: A Power System Perspective
Chandra Sekhar and P.C. Panda.

On the Design of Multiplier-less Nonuniform Filterbank Transmultiplexer Using Particle Swarm
Optimization
Manoj V J and Elizabeth Elias

Sliced Particle Swarm Optimization (SPSO); A Computationally Efficient Optimization Technique
Harish Garg, S.S. Pattnaik, Swapna Devi, K. M. Bakwad, B. K. Panigrahi and S. K Das.

Gray-level Image Enhancement by Particle Swarm Optimization
Apurba Gorai and Ashish Ghosh

Classification System For Digital Signal Types Using Neuro Fuzzy System and PSO
Aleefia Khurshid and Alhad Gokhale.

NaBIC SS3   Bioinformatics   Dec 09, 2009 15.00-17.00   Venue : F202

A Pre-microRNA Classifier by Structural and Thermodynamic Motifs
Vinod Chandra S. S. and Reshmi G..

PROSIMA: Protein Similarity Algorithm
Tom Novosad, Vaclav Snasel, Ajith Abraham and Jack Yang.

An Analytical Approach For Tracking The Tumor Systems Dynamics
Sudipta Bhattacharya and Durjoy Majumder.

Extraction of Interaction Information among Genes from Gene Expression Time Series Data
Debasish Datta, Amit Konar and R. Janarthana

Algorithms for Biological Cell Sorting with a Lab-on-a-chip
Arijit Ghosh, Rushin Shah, Arijit Bishnu and Bhargab B. Bhattacharya

Identifying Structural Repeats in Protein using Graph Centrality Measures
Ruchi Jain, Hari Krishna Yalamanchili and Nita Parekh

Graph Theoretic Approach for studying correlated motions in Biomolecules
Eshita Mutt, Monika Sharma, Jyothish Soman, Kishore Kothapalli and Abhijit Mitr

NaBIC SS4   Bioinspired algorithms   Dec 09, 2009   15.00-17.00   Venue : F203

Bee Hive At Work: A Problem Solving, Optimizing Mechanism
Pavol Navrat, Tomas Jelinek and Lucia Jastrzembska

A Study on Automation in Peptide Computing
Sakthi Balan Muthiah

A Comparative Study of Policies in Q-Learning for Foraging Tasks
Yogeswaran Mohan and Ponnambalam S. G..

An Extensive Review of Research in Swarm Robotics
Yogeswaran Mohan and Ponnambalam S. G..

DEPSO and Bacterial Foraging Optimization Based Dynamic Economic Dispatch with Non-Smooth Fuel Cost Function
Vaisakh K, Praveena P and Rama Mohana Rao S.

Ant Based Supervised And Unsupervised Land Use Map Generation Of Remotely Sensed Images
Anindya Halder, Susmita Ghosh and Ashish Ghosh.

NaBIC SS5   Grid Computing / Cellular Automata   Dec 09, 2009   17.45-19.30
Venue : EB Seminar Hall

GRASP and Grid Computing to Solve the Location Area Problem
Sónia M. Almeida-Luz, Manuel M. Rodríguez-Hermoso, Miguel A. Vega-Rodríguez, Juan A. Gómez-Pulido and Juan M. Sánchez-Pérez.

Job Submission to Grid using Mobile Device Interface
Sumathi Ganesan, Raghunath Rajachandrasekar, Rupak Nagarajan and Sridhar G

Load Balanced, Efficient Scheduling With and Parallel Job Submission in Computational Grids Using Parallel Particle Swarm Optimization
G Sudha Sadasivam

Cellular Automata for Image Noise Filtering
P. Jebaraj Selvapeter and Wim Hordijk.

Modeling Single Length Cycle Nonlinear Cellular Automata For Pattern Recognition
Sukanta Das, Sukanya Mukherjee, Nazma Naskar and Biplab K Sikdar

NaBIC SS6   Search and Optimization   Dec 09, 2009   17.45-19.30   Venue : F201

Tabu Search metaheuristic embedded in Adaptive Memory Procedure for the Profitable Arc Tour Problem
Jalel Euchi and Habib Chabchoub.

Cuckoo Search via Levy Flights
Xin-She Yang and Suash Deb

Multiobjective Frequency Assignment Problem using the MO-VNS and MO-SVNS algorithms
Marisa da Silva Maximiano, Miguel A. Vega-Rodríguez, Juan A. Gómez-Pulido and Juan M. Sánchez-Pérez.

Pre-warning Analysis in Traceability System for Food Production Supply Chain
Ke Zhang, Yi Chai, Simon X Yang and Gauri S Mittal.

Solving multiple-objective optimization problems using GISMOO algorithm
Arnaud Zinflou, Caroline Gagné and Marc Gravel.

A perspective view on Travelling Salesman Problem using Genetic Algorithm
Geetha Ramani R, Vasumathy Seenuvasan and Nishaa Bouvanasilan

NaBIC SS7   Intelligent Health Systems   Dec 09, 2009   17.45-19.30   Venue : F202

Pharmaco-informatics: Predicting an Ayurvedic Treatment for Hirschsprung's Disease.
Preenon Bagchi, Somashekhar R, Mahesh M and Rajesh TS.

 An In-Silico approach towards remediation of Schizophrenia
Preenon Bagchi , Kalidass S, Somasekhar R

Pattern Recognition on 2D Cervical Cytological Digital Images for Early Detection of Cervix Cancer
Jeremiah Suryatenggara, Bernadetta Kwintiana Ane, Maruli Pandjaitan and Winfried Steinberg.

Intelligent analysis of prostate ultrasound images
Aboul ella Hassanien, Hameed Al-Qaheri and Gerald Schaefer.

Genetic Algorithm Based Automated Medical Image Fusion Technique: Comparative Study with Fuzzy Fusion Approach
Mahua Bhattacharya and Arpita Das.

Insilico reaction kinetic model of shear stress induced eNOS activation in arterial endothelium
Dhanushya Ramachandran, Devika N.T. and Jaffar Ali B.M..

 Left Ventricular Contour Extraction from Cardiac MR Images Using CB and Random Walks Approach
Sarada Dakua and Jyotinder Sahambi

NaBIC SS8 (Special Session)   Particle Swarm Optimization   Dec 09, 2009 17.45-19.30
Venue : F203

Inserting information sharing mechanism of PSO to improve the convergence of DE
Musrrat Ali and V.P. Singh.

Optimization of Directional Overcurrent Relay Times Using Laplace Crossover Particle Swarm Optimization (LXPSO)
Kusum Deep and Jagdish Chand Bansal.

A New Diversity Guided Particle Swarm Optimization with Mutation
Radha Thangaraj, Millie Pant and Ajith Abraham.

 Optimal concurrent dimensional and geometrical tolerancing based on evolutionary algorithms
Sivakumar.K, balamurugan Balamurugan.C, Ramabalan.S and Venkata raman.S.B.

Parallel Artificial Bee Colony (PABC) Algorithm
Harikrishna Narasimhan.

Robust Prediction of Stock Indices using PSO based Adaptive Linear Combiner
Ritanjali Majhi, Ganapati Panda and Babita Majhi.

Multi-Colony Parallel Ant Colony Optimization on SMP and Multi-Core Computers
Pierre Delisle, Marc Gravel and Michaël Krajecki.

NaBIC SS9   **Genetic Algorithms**   **Dec 10, 2009 14.00-16.00**   **Venue : F201**

Evolving Colors in User Interfaces by Interactive Genetic Algorithm
Cosimo Birtolo, Paolo Pagano and Luigi Troiano.

Efficient Design of Pulse Compression Codes Using Multiobjective Genetic Algorithm
Ajit Kumar Sahoo, Ganapati Panda and Pyari Mohan Pradhan.

A Genetic Algorithm based Peer Selection Strategy for BitTorrent Networks
Tiejun Wu, Maozhen Li, Mahesh Ponraj and Man Qi

Finding Stable Conformations of Small molecules using Real Coded Genetic Algorithm
Shashi Barak, Kusum Deep and V.K Katiyar.

Searching Co-Integrated Portfolios by a Genetic Algorithm
Pravesh Kriplani and Luigi Troiano.

Searching for Quasigroups for Hash Functions with Genetic Algorithms
Vaclav Snasel, Ajith Abraham, Jiri Dvorsky, Eliska Ochodkova, Jan Platos and Pavel Kromer

NaBIC SS10   **Hybrid Systems**   **Dec 10, 2009**   **14.00-16.00**   **Venue : F202**

Double Circuit Transmission Line Fault Distance Location using Artificial Neural Network
Anamika Jain, A.S. Thoke and R. N. Patel.

Sample selection of microarray data using Rough-Fuzzy based approach
Amit Paul and Jaya Sil.

Association Rule Mining Using Multi-objective Genetic Algorithms: Strengths and Challenges
Rajul Anand, Abhishek Vaid and Pramod K. Singh.

Differential Evolution Particle Swarm Optimization Algorithm for Reduction in Network Power Loss and Voltage Instability
Vaisakh K, Sridhar M and Linga Murthy K S.

An Adaptive Neuro-Fuzzy Based Speed Sensorless Induction Motor Drives
R. A. Gupta, Rajesh Kumar and Rajesh Shankarrao Surjuse

KMSCD:Knowledge Management System for Crop Diseases
Savita Kolhe, Raj Kamal, Harvinder S. Saini and Girish Kumar Gupta.

NaBIC SS11 Pattern Recognition/ Document and Text Analysis Dec 10, 2009 14.00-16.00

Venue : EB Seminar Hall

An Empirical Study of Conserved Self Pattern Recognition Algorithm By
Comparing to Other One-Class Classifiers and Evaluating With Various Random Number Generators
Senhua Yu and Dipankar Dasgupta.

Hyper-heuristic Decision Tree Induction
Alan Vella, David Corne and Chris Murphy

Automatic Extraction of Events from Textual Requirements Specification (Computing with Words)
Sandeep Singh, Sangeeta Sabharwal, JP Gupta and Reetesh Gupta

A Spatial Approach to Perception Identification in Editorials
Supraja Jayakumar

An Application of Bayesian Networks in Predicting Form Entries
Luigi Troiano, Gennaro Cirillo, Cosimo Birtolo and Roberto Armenise.

NaBIC SS12   Finance / Differential Evolution   Dec 10, 2009   14.00-16.00   Venue : F203

Discovering Effective Technical Trading Rules with Genetic Programming: Towards Robustly Outperforming Buy-and-Hold
Dome Lohpetch and David Corne

A New Model for Credit Approval Problems: A Quantum-Inspired Neuro-Evolutionary Algorithm with Binary-Real Representation
Anderson Pinho, Marley Vellasco and André Cruz

Constrained Portfolio Rebalancing with Transaction Costs using Evolutionary Wavelet Hopfield Network Strategy
N.C Suganya and G.A Vijayalakshmi Pai

A Simple Adaptive Differential Evolution Algorithm
Radha Thangaraj, Millie Pant and Ajith Abraham

A Comparative Performance Analysis of Differential Evolution and Dynamic Differential Evolution Variants
G. Jeyakumar and C. Shunmuga Velayutham

Differential Evolution and Swarm Intelligence techniques for Analog Circuit Synthesis
Samrat L. Sabat, Shravan kumar and Siba K. Udgata.

Paired Comparisons-based Interactive Differential Evolution
Hideyuki Takagi and Denis Pallez

NaBIC SS13   Communication Networks   Dec 10, 2009   17.15 - 19.00
                                                        Venue : EB Seminar Hall

Modified BBO and Calculation of Resonant Frequency of Circular Microstrip Antenna
M.R. Lohokare, S.S. Pattnaik, Swapna Devi, B.K. Panigrahi, K.M. Bakwad and J.G. Joshi.

Profile Based Mobility Model in Vehicular Ad- Hoc Networks
Brijesh Kumar Chaurasia, Ajit Jaiswal, Geetam Singh Tomar and Shekhar Verma.

 Optimizing the reliability of Communication Network Using specially designed Genetic Algorithm
Anoj kumar, Krishn mishra and Arun Kumar Mishra

Monitoring Patient Health using Policy based Agents in Wireless Body Sensor Mesh Networks
Kevin Miller and Suresh Sankaranarayanan.

NaBIC SS14   Character & Handwriting Recognition / Biometrics
                              Dec 10, 2009 17.15 - 19.00   Venue F201

On Formulating a Probability of Random Correspondence of Biometrics Using Error Exponents
Jay Bhatnagar, Brejesh Lall and R K Patney.

 Development of Online Handwriting Recognition System : A Case Study with Handwritten Bangla Character
Asok Bandyopadhyay and Basabi Chakraborty

 Zone-Based Hybrid Feature Extraction Algorithm for Handwritten Numeral Recognition of Two Popular Indian Scripts
Rajashekararadhya S. V and Vanaja Ranjan P

Image processing Algorithms for Improved Character Recognition and Components Inspection
Anima Majumder.

NaBIC SS15   Fuzzy Systems/ Data Mining and Information Retrieval
Dec 10, 2009 17.15 - 19.00   Venue : F202

PSO Tuned Combined Optimal Fuzzy Controller for AGC of Two Area Interconnected Power System
S.K. Sinha, R. N. Patel and R. Prasad.

Short Term Load Forecasting using Fuzzy Adaptive Inference and Similarity
Amit Jain, E. Srinivas and Rasmimayee Rauta.

Efficient Compression of 4D fMRI Images using Bandelet Transform and Fuzzy Thresholding
R. Rajeswari and R. Rajesh.

An Efficient Fuzzy Possibilistic code book design for Vector Quantization based Image Compression in the Wavelet Packet Domain
R. Nagendran and P. Arockia Jansi Rani.

A Data Mining Approach for Jet Grouting Uniaxial Compressive Strength Prediction
Joaquim Tinoco, António Gomes Correia and Cortez Paulo.

Large Scale Information Retrieval using a Scatter Search based Approach
Habiba Drias, Dalal Daoudi and Samir Kechid.

NaBIC SS16   (Special Session)   Applied Mathematics for Nature Inspired Computing
Dec 10, 2009 17.15-19.00   Venue : F203

Study of Cost Functions in Three Term Backpropagation for Classification Problems
Siti Mariyam Shamsuddin, Razana Alwee and Maslina Darus

Differential Subordination Associated With Generalised Derivative Operator
Maslina Darus.

Insolvency Prediction Model Using Artificial Neural Network for Malaysian General Insurers
Saiful Hafizah Jaaman, Shu Chiet Ng, Noriszura Ismail and Siti Mariyam Shamsuddin

Customers' Satisfaction of Express Bus Service : Important-Performance Analysis (IPA) and Customer Satisfaction Index (CSI) Approach.
Zalina Mohd. Ali, Munira Ismail and Nur Riza Mohd. Suradi

The performance of M-based Generalized Linear Model (GLM) Procedures based on the coverage probability
Nora Muda.

Water Quality Study at Skudai River, 2002 – 2006
Zalina Mohd Ali Mohd Ali and Faridatulazna Ahmad Shahabuddin Ahmad Shahabuddin

NaBIC SS17   Evolutionary Computing   Dec 11, 2009   09.00 - 10.45   Venue : F201

A Classical-cum-Evolutionary Multi-objective Optimization for Optimal Machining Parameters
Rituparna Datta and Kalyanmoy Deb

Nonlinear Polynomial Model Identification Using Multi-objective Evolutionary Optimization
Yu Cheng, Lan Wang and Jinglu Hu.

Empirical Study on the Effect of Crossover in Genetic Software Architecture Synthesis
Outi Räihä, Kai Koskimies and Erkki Mäkinen.

Stochastic Velocity Threshold Inspired by Evolutionary Programming
Zhihua Cui.

A Study of Topology in Insular Parallel Genetic Algorithms
Carlos Raimundo Erig Lima, Heitor Silvério Lopes and Leonardo Gomes Tavares

An Investigation of Topologies and Migration Schemes for Asynchronous Distributed Evolutionary Algorithms
Muhannad Hijaze and David Corne.

A Java Library for Genetic Algorithms Addressing Memory and Time Issues
Luigi Troiano and Davide De Pasquale

Evolutionary Approach to Produce Classifier Ensemble Based on Weighted Voting
Michal Wozniak.

NaBIC SS18   Swarm Intelligence and PSO II   Dec 11, 2009   09.00 - 10.45
Venue : EB Seminar Hall

Failure Prediction of Banks Using Threshold Accepting Trained Kernel Principal Component Neural Network
Ravisankar Pediredla and V. Ravi

Adaptive Accelerated Exploration Particle Swarm Optimizer for Global Multimodal Functions
Samrat L Sabat, Layak Ali, Siba K. Udgata,

Swarm intelligence approach of leaker identification In secure multicast
Sreelaja N.K and G.A.Vijayalakshmi Pai

A PSO Based method for Detection of Brain Tumors from MRI
Satish Chandra, Rajesh Bhat and Harinder Singh

Optimal Placement of Phasor Measurement Units using Particle Swarm Optimization
Abhinav Sadu, Rajesh Kumar and Rajesh Kavasseri

NaBIC SS19   Robotics   Dec 11, 2009   09.00 - 10.45   Venue : F202

Strategies of Division of Labour for Improving Task Efficiency in Multi-Robot Systems
Sifat Momen and Amanda Sharkey

Distributed Area Coverage Using Robot Flocks
Ke Cheng, Prithviraj Dasgupta and Yi Wang

Construction and Improvement Heuristics applied to the Capacitated Vehicle
Leonardo Gomes Tavares, Heitor Silvério Lopes and Carlos Raimundo Erig Lima

Design and implementation of fractional order pid controller for Aerofin control system
Ravi Kumar Jatoth and Venu Kishore Kadiyala.

A novel methodology for indoor positioning
Md. Ahsan Habib and Tasbirun Nahian Upal.

NaBIC SS20   ACO/ Immune Systems   Dec 11, 2009   09.00 - 10.45   Venue : F203

Performance Analysis of ACO Algorithm Using Fourier Transform
Raghavendra GS, Prasanna Kumar N and Amit Dharmaraj Borase.

ACO Approaches for Large Scale Information Retrieval
Habiba Drias, Moufida Rahmani and Manel Khodja.

Change detection in dynamic fitness landscapes: An immunological approach
Hendrik Richter

Development of a Nonlinear Model of Unijunction Transistor using Artificial Immune System
Satyasai Jagannath Nanda, Sasmita Kumari Behera and Ganapati Panda.

Improved Protein Structural Class Prediction Using Genetic Algorithm and Artificial Immune System
Sitanshu Sekhar Sahu, Ganapati Panda and Satyasai Jagannath Nanda.

NaBIC SS21   Clustering   Dec 11, 2009   11.00 - 12.45   Venue : F201

A novel intuitionistic fuzzy c means color clustering of human cell images
Tamalika Chaira.

 An Incremental Clustering of Gene Expression data
Rosy Das, Dhruba Bhattacharyya and Jugal Kalita

A Novel Clustering Based Niching EDA for Protein Folding
Benhui Chen and Jinglu Hu

Development of FCM based algorithm for the delineation of QRS-complexes in Electrocardiogram
Nitin Lingayat, Sarabjeet Singh Mehta and Swati Sharma

An Evolutionary Gene Expression Microarray Clustering Algorithm Based on Optimized Experimental
Conditions
Mrinal Sen, Sheli Sinha Chaudhury, Amit Konar and Ramadoss Janarthanan

A Particle Swarm Approach for Uniform Cluster Distribution in Data Centric Wireless Sensor Networks
Bhaskar Deosarkar, Narendra Singh Yadav and Rajendra Prasad Yadav

NaBIC SS22   Intelligent Systems   Dec 11, 2009   11.00 – 12.45   Venue : F202

A Randomized Iterative Improvement Algorithm for Photomosaic Generation
Harikrishna Narasimhan and Sanjeev Satheesh

Cost Optimal Design of 3-D Steel Building Frames Using CA-LFSR
Debasish Moitra, Prosenjit Das, Pushan Mitra and Biplab K Sikdar

Spaces of Imitation
Elpida Tzafestas.

The Changing Trend of User Applications and Operating System Design Objectives for Parallel
Computing by Reconfigurable FPGAs
Radha Guha.

Towards The Adaptive Questionnaire Generation Using Soft Computing
Sumit singh and Ayushi Garg

NaBIC SS23   Nature inspired Soft Computing Applications Dec 11, 2009 11.00 – 12.45
Venue: F203

Palmprint Authentication Using Fusion of Wavelet Based Representations
Prasad S. M., Govindan V. K. and Sathidevi P. S.

Building Consensus of Human Papillomavirus using Genetic Algorithm
Aditya Bir, Jyotsna Dongerdive, Suruchi Jamkhedkar and Siby Abraham.

Unit Commitment with Nature and Biologically Inspired Computing
Lingamurthy Belede, Amit Jain and Ravikanth Reddy Gaddam.

Simulation of Bionic Electrolocation Sensor based on Weakly Electric Fish
Gerhard von der Emde, Kavita Mayekar, Herbert Bousack and Michael Pabst.

Developing Through a Modeling of the Database and preparing for Data Mining: Implementation for EHR to Cardiovascular Monitoring
Hugo Bulegon, Silvio Bortoleto and Angelmar Constantino Roman, Claudia Maria Cabral Moro, Francisco Javier, Navarro Kantek, Katia bortoleto.

Utilization of the Apriori Data Mining method in a research software with electronic protocol in Enteral Nutrition
Carlos Henrique Kuretzki, Maria Eliana M. Schieferdecker, Jose Simao de Paula Pinto, Osvaldo Malafaia, Antonio Carlos Ligocki Campos and Silvio bortoleto.

An information system for drug interactions: pharmaceutical care and prescription
Luciano Roberto Hirano, Cláudia Seiko Yokoyama, Silvio Bortoleto, Claudia Marai Cabral Moro, Hugo Bulegon and Percy Nohama

CISIM 2009   Session Schedules

CISIM SS1   Computational Intelligence   Dec 09, 2009   15.00-17.00   Venue : Y202
Invited Talk: I (15.00-15.30)
Gerald Schaefer, Loughborough University, United Kingdom

Evolutionary Algorithms Based Speed Optimization of Servo Motor in Optical Disc Systems
Radha Thangaraj, Millie Pant and Ajith Abraham.

MALBACO - A New Multi-Agent Load Balanced Ant Colony Optimization Algorithm for MANETs
Ditipriya Sinha and Rituparna Chaki

An Empirical Comparison of Differential Evolution Variants on Different Classes of Unconstrained Global Optimization Problems
G. Jeyakumar and C. Shunmuga Velayutham

SOM Neural Network - a Piece of Intelligence in Disaster Management
Petr Klement

A Study on Genetic Algorithm based Video Abstraction System
D. K. Ashwin Raju and C. Shunmuga Velayutham

CISIM SS2   Computational Models   Dec 09, 2009   17.45-19.30   Venue : Y202

Effect of beta in Random Walks Approach for LV Contour Extraction
Sarada Dakua and Jyotinder Sahambi.

Modeling and Predicting Stock Returns using the ARFIMA-FIGARCH A case study on Indian Stock data
Palaniappan Bagavathi Sivakumar and V P Mohandas.

 Towards Modeling Stored-Value Electronic Money Systems
Shunsuke Inenaga, Kenichirou Oyama and Hiroto Yasuura

Obtaining a Continuous Time Markov Decision Process from Statecharts
Marcelino Silva, Ádamo Santana, Carlos Francês, Nandamudi Vijaykumar and Solon Carvalho.

Active Contours without Edges and without Reinitialisation
Eduard Sojka, Jan Gaura, Tomáš Fabián and Michal Krumnikl.

Modeling & Analysis of Transaction Management for Distributed Database Environment using Petri Nets
Bidyut Biman Sarkar and Nabendu Chaki.

CISIM SS3   Intelligent Systems   Dec 10, 2009   14.00-16.00   Venue : Y202

Invited Talk: II   (14.00-14.30)
Siti Mariyam Shamsuddin, Universiti Teknologi Malaysia, Malaysia

Hybrid Multispectral Image Fusion Method
Tanish Zaveri, Mukesh Zaveri and Ishit Makwana

.
 Analysis of Mammograms using Fractal features
Deepa Sankar and Tessamma Thomas

Data Diverse Fault Tolerant Architecture for Component Based Systems
Arijit Sil, Oishila Bandyopadhyay and Nabendu Chaki.

Comparative Analysis of Intelligent Hybrid Systems for detection of PIMA Indian Diabetes
Rahul Kala, Anupam Shukla and Ritu Tiwari.

A Basic Concept of Displaying Electronic Text with Seamless Pages -Magnifying And Simplifying System for Text EXTension (MaSSTExt)
Seiji Sugiyama, Miyuki Shibata, Atsushi Ikuta, Susumu Saito and Seiki Miyashita.

CISIM SS4 Information Systems and Security Dec 10, 2009   17.15-19.00 Venue : Y202

Invited Talk: III   (17.15-17.45)
Václav Snášel, VSB-Technical University of Ostrava, Czech Republic

CAM Based High-Speed Compressed Data Communication System Development using FPGA
Tribeni Prasad Banerjee, Amit Konar and Ajith Abraham

Large Quasigroups in Cryptography and their properties Testing
Eliska Ochodkova, Jiri Dvorsky, Vaclav Snasel and Ajith Abraham.

Quantitative Security Risk Assessment (SRA) Method: An empirical case study
Danilo Valeros Bernardo, Bee Bee Chua and Doan Hoang.

Morphological Analysis And Reconstruction Techniques For Computer Tomography
V.E. Asadchikov, A.I. Chulichkov, A.V. Buzmakov, M.V. Chukalina, D.P. Nikolaev, R.A. Senin and Gerald Schaefer.

CISIM SS5   Pattern Recognition I   Dec 11, 2009   9.00-10.45   Venue : Y202

Invited Talk: IV (9.00-9.30)
Piotr Porwick, University of Silesia, Poland

Intelligent System For Arabic Character Recognition
Khalid Saeed, Majida Bakoor and Fadel Sukkar

 Efficient Image Tamper Detection and Recovery Technique using Dual Watermark
Surya Bhagavan Chaluvadi and MVNK Prasad

Evolutionary algorithms for fast and accurate watermark retrieval
E.V. Gopal, MVNK Prasad and V. Ravi.

CISIM SS6   Pattern Recognition II   Dec 11, 2009   11.00-12.45   Venue : Y202

Invited Talk: V (11.00 – 11.30)
Clif Kussmaul, Muhlenberg College, USA

A View-based Approach for Recognition of Bengali Printed Characters
S. H Shaikh, N. Chaki, M. Tabedzki, K. Saeed

A Support Vector Machine Classifier of Emotion from Voice and Facial Expression Data
Pavel Bhowmik, Sauvik Das and Amit Konar

A Three Tier Scheme for Devanagari Hand-printed Character Recognition
Satish Kumar

A new signature similarity measure
Piotr Porwik, Rafal Doroz and Krzysztof Wrobel

Software Cost Estimation using Computational Intelligence Techniques
Jankisharan Pahariya, Ravi Vadlamani and Mahil Carr.

NaBIC -CISIM Poster Sessions I   Dec 09, 2009   17:15 – 17.45

NaBIC 2009

Genetic algorithm based reduction of electromagnetic field pollution
Tomislav Rolich and Darko Grundler
.
Evolving Solutions to the School Timetabling Problem
Rushil Raghavjee and Nelishia Pillay.

Cooperative Coevolutionary Invasive Weed Optimization and its Application to Nash Equilibrium Search in Electricity Markets
Hossein Hajimirsadeghi, Amin Ghazanfari, Ashkan Rahimi-Kian and Caro Lucas.

Game Theoretic Trust Model for Peer to Peer Networks
Siddarrthraman.R, Vignesh Laligam Sundaresan, Ganesh Kumar. M. GaTMo:

Adaptive Control for Nonlinear Systems Based on Quasi-ARX Neural Network
Wang Lan, Yu Cheng and Jinglu Hu.

A Dynamic Pattern Recognition Approach Based on Neural Network for Stock Time-Series
Bo Zhou and Jinglu Hu.

D.G. t - Communicating Iso-Array P System
Annadurai S, Kalyani T, Dare V.R and Thomas

Coordinator Selection in Distributed Systems: Cellular Automata Model Based Approach
Kalyna Mahata and Sukanta Das.

Is Stochastic Ranking really better than Feasibility Rules for Constraint Handling in Evolutionary Algorithms?
Sulabh Bansal, Ashish Mani and Patvardhan C

CISIM 2009

Auditing Public Key Infrastructure Systems: An agent based approach
Arun Babu P, Sivakumaran M V and Dhavale N P.

Design Methodology Internal Sub State Observer Using CPLD
Tribeni Prasad Banerjee and Rangeen Basu Roy Chowdhury

Review on Ant Miners
V.K. Panchal, Poonam Singh, Appoorv Narula, Ashutosh Mishra and Nitish Paliwal

Performance of Hierarchical Agent based Wireless Sensor Mesh Network for Patient Health Monitoring
Benjamin Norman and Suresh Sankaranarayanan.

NaBIC - CISIM Poster Sessions II   Dec 10, 2009   16.30-17.15

NaBIC 2009

Traffic Organization by Utilization of Resources Through Grid Computing Concept
Subhamita Mukherjee, Indrajit Pan and Kashi Nath Dey

Design of decoder in quantum computing based on spin field effect
Saeid Rafiei, Amir Abolfazl Suratgar, Avat Taherpour and Abolghasem Babaei.

Modeling amino acid strings using electrical ladder circuits
Roger Marshall
Systems Biology Markup Language for Cancer System
Avishek Das, Suryasarathi Barat and Durjoy Majumder.

Biogeography Based Land Cover Feature Extraction
Samiksha Goel, VK Panchal and Mitul Bhatnagar.

Localization using Average Landmark Vector in the presence of clutter
Pratik Chaudhari

Transaction Mapping Based Approach for Mining Software Specifications
R. Jeevarathinam Jeeva and Antony Selvadoss Thanamani Antony.

Application Of Neural Network To Estimation Dimension of Muscle Cracks In Eddy Current Testing
Abolghasem Babaei and Saeid Rafiei.

A State-of-the-art Review of Population-based Parallel Meta-heuristics
Madhuri Gupta and Kusum Deep.

Solving Nonconvex Trim Loss Problem using an Efficient Hybrid Particle Swarm Optimization
Kusum Deep, Pinkey Chauhan and Jagdish Chand Bansal

Multiobjective Particle Swarm Optimization Approach to Portfolio Optimization
Sudhansu Kumar Mishra, Ganapati Panda and Sukadev Meher.

Comparative Analysis of Neural Model and Fuzzy Model for MR Brain Tumor Image Segmentation
Jude Hemanth D, Kezi Selva Vijila C and Anitha j.

 An Overview of Neural Networks in Simulation Soccer
William Plant and Gerald Schaefer

A Reconfigurable FPGA Framework for Data Fusion in UAV's
Veera Ragavan Sampath Kumar, Ganapathy Velappa and Ming Xian Chong.

CISIM 2009

Pattern Extraction Methods for Ear Biometrics - A Survey
Ramesh Kumar PanneerSelvam
Group-oriented signature schemes based on Chinese remainder theorem
Porkodi Ganesan and R.Arumuganathan Ramalingam.

A New Protocol Model for Verification of Payment Order Information Integrity in Online E Payment System
Sandeep Raghuwanshi, Mr. R.K. Pateria and R.P. SIngh.

Receiver Based Packet Loss Replacement Technique for High Quality Voip Streams
Kanapathy Maheswari.

Characterizing L2 Cache Behavior of Programs on Multi-core Processors: Regression Models and Their Transferability
Jitendra Kumar Rai, Atul Negi, Rajeev Wankar and K. D. Nayak

Doctoral Symposium papers   Dec 08, 2009   09:30-11:00

Using Neural Networks to Identify More Proteins in High-Throughput Proteomics
Leo McHugh.

Applications of Parallel Genetic Algorithms in Groundwater Contamination
Sunita Sharma.

Modified Differential Evolution Algorithms For Global Optimization
Musrrat Ali

Abstracts of NaBIC 2009 Plenary Talks

Plenary Talk I   **Venue: Assembly Hall, Dec 9, 2009, 9.00 – 10.00**

David Wolfe Corne, Heriot Watt University, UK

Abstract: A small number of independent strands of research since the 1960s have explored ways to automatically combine individual heuristics to help solve problem instances, or in some cases to produce new algorithms. The current buzzword "hyper-heuristics" arises from this activity. Hyper-heuristics is largely concerned with manipulating the order of execution of individual heuristics (e.g. such as dispatch rules in scheduling, or first-fit, best-fit, and so on, in bin-packing) in search for the best solutions to a given problem instance. Often, bio-inspired methods, or reinforcement learning methods, are used to do the manipulation. A small portion of this overall activity is, in some contrast, concerned with the development of new algorithms --i.e. combinations of low-level heuristics that not only solve a given instance, but are reusable for a class of instances. To distinguish this type of activity, which I believe is particularly promising, and far more interesting than using hyper-heuristics for solving single instances, I call it Super-heuristics. Super-heuristics has achieved some notable successes so far, and could lead to enormously more efficient and effective optimization in certain areas of industry. In this talk I will try to characterize the state of the art in super-heuristics, and set out several potentially promising ways forward.

Plenary Talk II   **Venue: Assembly Hall, Dec 9, 2009, 10.00 – 11.00**

Hendrik Ritcher, Institut Mess- Steuerungs- und Regelungstechnik, Germany

Abstract: Many real world optimization problems are dynamic, which means that the fitness function changes with time and that the timescale of these changes is in the same magnitude as the run-time of the
evolutionary algorithm. It is well-known that evolutionary algorithms are remarkably successful in solving static optimization problems showing a high degree of problem difficulty. In recent years it further has been shown that these problem solving abilities can also be used to tackle dynamic optimization problems. However, certainmodifications in the algorithmic structure of the evolutionary algorithm are necessary to make it work in dynamic fitness landscapes.Dynamic optimization means no longer to find one optimal solution, but to track the movement of the optimal solution with time. This situation means that the algorithm must be equipped with some additional schemes which can control, maintain and occasionally enhance the population's diversity. In the talk I will discuss recent results in designing evolutionary algorithms that are fit to perform in dynamic environments. This will cover approaches dealing with the diversity issue namely random diversity enhancement schemes, memory schemes and anticipation/prediction methods. Another topic that will be addressed is the question of how to find out if the fitness function has changed, also know as the change detection problem.

Plenary Talk III   **Venue: Assembly Hall, Dec 9, 2009, 11.15 – 12.00**

Kamala Krithivasan, Indian Institute of Technology, Madras, India

Abstract: 'Natural Computing' is an area which is pursued with interest in recent times. 'Cellular computing' is a part of Natural Computing. One model of cellular computing is membrane computing (P Systems) initiated by Gh. Paun in 1998, aiming at devising a computing model inspired by the structure and functioning of living cells. It is a parallel and distributed model of computing.

In the basic model of P systems, one considers a membrane structure consisting of several cell-like membranes which are hierarchically embedded in a main membrane, called the skin membrane. Membranes with no other membranes embedded in them are called elementary. The membranes delimit regions, where we place objects. The objects evolve in nondeterministic maximally parallel manner according to given evolution rules. The objects can also be described by strings and then they are processed by string operations. Starting from an initial configuration, identified by membrane structure and objects in all regions, and using evolution rules, we get a computation. We consider a computation complete when it halts, i.e., no further rule can be applied. The result of the halting computation is defined on the basis of the objects we obtained in a specified membrane or expelled from the skin membrane. We may look at membranes to correspond to regions in cells and objects to chemical compounds and use rules to describe the evolution of those chemical compounds. In this talk some basic concepts about membrane computing will be discussed and some variations of the basic model explained. The talk will also touch upon a new variant 'Spiking Neural P Systems'.

Plenary Talk IV   **Venue: Assembly Hall, Dec 9, 2009, 12.00 – 13.00**

Mario Koeppen, Kyushu Institute of Technology, Japan

Abstract: Gestalt and corresponding Gestalt laws of vision are apparent phenomena of visual perception that still lack general understanding, despite of passing more than 100 years after its first mentioning in psychological literature. In this contribution, we want to promote Gestalt as a kind of challenge to the naturally and biologically inspired computation community. Browsing a bulk of existing research literature on the Gestalt theme, with only a few notable exceptions (like the Helmholtz principle), there is not much indication for a comprehensive approach to the understanding of Gestalt, for having explanations about the means for its application, or for advancement in the provision of models reflecting the complex interplay of Gestalt laws in a verifiable manner. Said this, currently Gestalt triggers more questions than answers, and it might slowly become obvious that Gestalt is more than being just a source of inspiration for new algorithms, or for stimulating modifications of existing algorithms. It also gets slowly more clear that the only open issue is not just a lack of "holistic view" in present science, as it is often stated. It seems that any further progress in this regard might require a more rigorous departure from existing computational paradigms and concepts than expected. In this talk, the state of research on Gestalt in engineering sciences, esp. image processing and pattern analysis, will be critically reviewed, and their strong and weak points will be evaluated. But moreover, new emerging computational paradigms and models will be evaluated according to what they might provide to the understanding of Gestalt. Among these paradigms and models, we can find the Neural Darwinism, which relates evolutionary concepts to the processing of the brain, or the recently proposed Cogency Confabulation, which relates learning with the maximization of a priori probability, and which is accompanied by a novel neural network architecture. But going further, Gestalt guides to rather more fundamental issues of general system modelling, and some relations to unconventional biological theories like Rosen's MR-systems will be reflected as well.

Plenary Talk V   **Venue: Assembly Hall, Dec 9, 2009, 14.00 – 15.00**

Prof Gauri Mittal, University of Guelph, Canada

Abstract: Metal, plastics and glass fragments found in packaged bottles, packages and containers are big concern for food processors. Using ultrasound to detect these fragments in the containers poses a challenging task for signal processing and classification. Various novel signal processing techniques are developed and discussed. The center frequency pressure ratio (CFPR), variance, and backscattered amplitude integral (BAI) methods have approximately the same overall detection rating. Root mean square (RMS) method has the highest overall detection rating. A hybrid of these methods has significantly improved object detection rating. Image processing algorithm is based on the longitudinal (vertical) tracing of a center frequency component obtained using short-time Fourier Transform (STFT) in conjunction with a transversal (horizontal) differentiation of the image pixels. This method has improved ability to detect small glass fragments inside the bottle. Radial Basis Function Neural Network (RBF-NN) is used for signal classification. The output of the RBF layer is determined by the distance between the input vector and its centroid vector. Successful classification rate of 95% was achieved using RBF-NN method.

A rapid and cost effective technique for identification and classification of microorganisms was explored using fluorescence microscopy and image analysis. After staining the microorganisms with fluorescent dyes (diamidino-2-phenyl-indole (DAPI) and acridine orange, AO), images of the microorganisms were captured using a CCD camera attached to a light microscope. Geometrical, optical and textural features were extracted from the images using image analysis. From these parameters, the best identification parameters that could classify the microorganisms with higher accuracy were selected using a probabilistic neural network (PNN). PNN was then used to classify the microorganisms with a 100% accuracy using those identification parameters.

Plenary Talk VI   **Venue: Assembly Hall, Dec 10, 2009, 10.00 – 11.00**

Hideyuki Takagi, Kyushu University, Japan

Abstract: The first topic of this talk is to show new types of Interactive Evolutionary Computation (IEC) application researches. Major IEC applications are optimizing target systems and creating graphics, images, shapes, sounds, vibrations, and others. We introduce two new types of IEC applications. The first one is measuring human characteristics. IEC is an optimization method based on human subjective evaluation. Likely reverse engineering, we may measure the evaluation characteristics or mental conditions of an IEC user by analyzing the outputs from the target system optimized by the user. The second one is extension of IEC evaluation. Usually IEC optimizes a target system based on IEC user's subjective evaluation, i.e. psychological evaluation. We may extend the evaluation from psychological one to physiological one. We show the framework of the extended IEC.   The second topic of this talk is to overview researches that try to reduce IEC user fatigue and show our latest research in this area. Several approaches have been proposed to reduce IEC user's fatigue; some of them are improving input/output interface, accelerating EC search, allowing human intervention into EC search, estimating human evaluations, and others. Here, we introduce our latest research and show our view.

Plenary Talk VII   **Venue: Assembly Hall, Dec 10, 2009, 11.15 – 12.00**

Michal Wozniak, **Wroclaw University of Technology, Poland**

Abstract: Problem of pattern recognition is accompanying our whole life. Therefore methods of automatic classification is one of the main trend in Artificial Intelligence. The aim of such task is to classify a given object to one of predefined categories, on the basis of observing the features of the object. There is much current research into developing even more efficient and accurate recognition algorithms like neural networks, statistical and symbolic learning. Multiple classifier systems are currently the focus of intense research and in many review articles this trend has been mentioned as one of the most promising in the field of the pattern recognition. In the beginning in literature one could find only majority vote, but in later works more advanced methods of finding a common solution to the classifier group problem were proposed. There is a number of important issues while building the aforementioned multiple classifier systems like classifier selection for committee or choice of collective decision making method to name only a few. The proposed speech will present short review of the main methods of combined pattern recognition and their limits. The presented remarks will be illustrated by the results of experiments based on real classification problems.

Plenary Talk VIII   **Venue: Assembly Hall, Dec 10, 2009, 12.00 – 13.00**

Dipankar Dasgupta, University of Memphis, USA

Abstract: The biological immune system (BIS) is a highly parallel and distributed adaptive system. It uses feature extraction, memory, diversity and associative retrieval to solve recognition and classification tasks. In particular, it learns to recognize relevant patterns, remember previously encountered patterns and use combinatorics to construct pattern detectors efficiently. These remarkable information-processing abilities of the immune system has inspired an emerging field, sometimes referred to as the Immunological Computation, Immuno-computing or Artificial Immune Systems (AIS) that extracts ideas from BIS to develop computational tools for solving science and engineering problems.

Over the last two decades, there has been an increased interest in immuno-inspired techniques and their applications. In general, some of such models are intended to describe immunological processes for a better understanding of the dynamical behavior of the BIS in the presence of antigens. On the other hand, immunity-based models have been developed in an attempt to solve wide variety of real-world problems. In particular, there exist a number of applications in pattern recognition, fault detection, computer security; also other applications currently being explored in science and engineering problem domain. This talk will cover the latest advances in Immunological approaches and a few real-world applications.

Abstracts of CISIM 2009 Invited Talks

Invited Talk I   **Venue : Y202   Dec 09, 2009   15.00 – 15.30**

Gerald Schaefer, Loughborough University, United Kingdom

Abstract: Content-based image retrieval (CBIR) has been a very active research area over the last two decades with many interesting and promising approaches having been proposed that allow the retrieval of images based on features directly extracted from the images. However, since these features are typically low-level features, such as colour, texture or shape descriptors, it is hard to translate these into the higher-level semantic understanding of humans. Bridging this semantic gap still remains a challenge to be solved. An interesting alternative to query-based approaches are image database navigation systems which allow the user to visually browse large image collections to arrive at images of interest in an effective, intuitive and efficient manner. The design of such browsing systems can be typically divided into two issues: visualisation of the image collection and the actual browsing of this visualisation. Visualisation deals with the problem of presenting an image database in a way that the user is immediately able to grasp. The main difficulty here is of course how to deal with the large number of images that are present in the dataset. Various approaches to tackle this issue will be discussed. Mapping-based visualisations project thumbnail images into the typically 2-dimensional visualisation space in such a way that images which are visually similar are located close to each other in the visualisation. Clustered vsiualisations attempt to reduce the number of image that are required to be displayed at any one time by grouping similar together based on visual similarity. Graph-based visualisations utilise links between images to construct a graph where the nodes of the graph are the images and the edges the links between similar images. Once an image database is displayed, the user should then be able to browse this collection. In order to be able to do this efficiently, various browsing operations are highlighted. These can be grouped into horizontal browsing operations which allow navigation within a single plane of visualised images, and vertical browsing which provides a means of navigating a hierarchical browsing structure. Benchmarking image database navigation tools proves to be difficult due to the lack of a defined set of tasks and a standardised image dataset. A set of guidelines for benchmarking image browsing systems will be presented and discussed.

Invited Talk II   **Venue : Y202 Dec 10, 2009   14.00-14.30**

Siti Mariyam Shamsuddin, Universiti Teknologi Malaysia, Malaysia

Abstract: Biometric Technology has become an important research area now days. A biometric system is fundamentally pattern recognition systems that work by gaining biometric attributes from an individual, undergoing feature extraction and evaluating the extracted feature set against the model set in database. As such, the strong need to identify the right authorship in fast, easy to use or for security experiences tremendous growth, resulting in many applications being developed and commercialized. The biometric data comprises of Handwriting, Signature, Iris, Facial Features, Fingerprints and others. In this study, we propose a new framework of Pattern Recognition with Discretization Component being introduced to granularly mine the features of interest for Authorship Invarianceness. In our research, Authorship Invarianceness is obtained through proposed integrated moment invariants and discretization scheme. The integrated moment invariants are derived from Geometric Functions and United Moment Invariants, while discretization scheme is done by dividing the range of continuous attributes into disjoint regions (interval),and labels are given to replace the actual data values. The proposed method is categorized as supervised method since it needs class information to perform discretization process. It globally process all integrated invariants feature vector for all writers with dynamic characteristics and search for the suitable set of cuts to represent the real data for each writer. Later, the data are divided into the range of minimum to maximum of each writer with equal size of interval or cuts. Number of cuts is based on the number of feature vector for each word image, i.e, eight feature vector values of proposed invariants are used to represent a pattern image. This is aligned to the theory of geometric moment function and to keep the original number of invariant vector in moment

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invariant function that has been applied. The results show that the proposed framework for writer identification with discretization component has given significant impact on the performance of writers' identification.

Invited Talk III   **Venue : Y202 Dec 10, 2009   17.15-17.45**

Václav Snášel, VSB-Technical University of Ostrava, Czech Republic

Abstract: Specific communication applications and devices such as email, instant messenger, blogs, discussion forum, and mobile telephony have led to an age of perpetual contact - social relations. Social Network Analysis (SNA) is the study of social relations among a set of actors. The key difference between network analysis and other approaches to social science is the focus on relationships between actors rather than the attributes of individual actors. A common framework for SNA is the mathematical approach of graph theory. This talk gives an overview of the basic SNA concepts.

Invited Talk IV   **Venue : Y202 Dec 11, 2009   09.00-09.30**
Piotr Porwik, University of Silesia, Katowice, Poland

Abstract: Finger imprints are commonly used by police departments and many other civil areas of access protection. These methods still expand because acquisition quality of devices (fingerprint scanners) is still growing – manufacturers improve resolution of such measuring instruments. In addition, new algorithms based on modern image processing allow to extract the new type of fingerprint features. Also new chemical methods allow to detect a fingerprint on materials, what has been very hard or impossible to achieve until now. It will be more precisely explained and shown during the speech.

Invited Talk V   **Venue : Y202 Dec 11, 2009   11.00-11.30**
Clif Kussmaul, Muhlenberg College, USA

Abstract: Free and Open Source Software (FOSS) is distributed without charge and with the original source code, so that anyone can fix defects, add enhancements, or otherwise modify the software and share their changes with others. In education, FOSS can provide several benefits. First, successful FOSS usually has a robust implementation, since many developers work on them briefly or intermittently. Second, FOSS usually has a varied user community, which demonstrates the role and value of communication and supporting tools.

Third, students may already be familiar with FOSS as users. We describe how faculty can help students by using a five step "USABL" model in which students use FOSS projects, study the project as a worked example, add minor enhancements, build larger components, and finally leverage FOSS for other purposes. We describe experiences using FOSS and this approach across a computer science curriculum and particularly in a software engineering course and in capstone projects.

Abstracts of Accepted Papers

NaBIC- CISIM 2009

NaBIC 2009   Session Schedules

NaBIC SS1   Neural Networks   **Dec 09, 2009**   **15.00-17.00**
Chair(s): K Kritivasan and V Ravi   **Venue: EB Seminar Hall**

**An Enhanced Counter Propagation Neural Network for Abnormal
Retinal Image Classification** (#13)
Anitha J, Kezi Selva Vijila C and Jude Hemanth D.

Artificial Neural Networks (ANN) is gaining significant importance for pattern recognition applications particularly in the medical field. A hybrid neural network such as Counter Propagation Neural Network (CPN) is highly desirable since it comprises the advantages of supervised and unsupervised training methodologies. Even though it guarantees high accuracy, the network is computationally non-feasible. This drawback is mainly due to the high convergence time period. In this paper, a modified Counter Propagation Neural Network is proposed to tackle this problem which eliminates the iterative training methodology which accounts for the high convergence time. To prove the efficiency, this technique is employed on abnormal retinal image classification system. Real time images from four abnormal classes are used in this work. An extensive feature vector is framed from these images which forms the input for the CPN and the modified CPN. The experimental results of both the networks are analyzed in terms of classification accuracy and convergence time period. The results suggest the superior nature of the proposed technique in terms of convergence time period and classification accuracy.

**Classification of fused images using radial basis function neural network for human
face Recognition** (#97)
Mrinal Bhowmik, Debotosh Bhattacharjee, Mita Nasipuri and Mahantapas Kundu

In this paper we present a technique for fusion of optical and thermal face images based on image pixel fusion approach. Out of several factors, which affect face recognition performance, illumination changes is a significant factor needs to be addressed. Other factors like sunglasses, beard, moustache etc are also very important factors which plays active role in adding complicacies to the recognition process. Fusion of thermal and visual images is a solution to overcome the drawbacks present in the individual thermal and visual face images. Fused images are projected into eigenspace and finally classified using a radial basis function neural network. In the experiments we have used Object Tracking and Classification Beyond Visible Spectrum (OTCBVS) database benchmark thermal and visual face images. Experimental results show that the proposed approach significantly improves the verification and identification performance and the success rate is maximum 96%.

Modeling Spiking Neural P systems using Timed Petri nets (#83)
Venkata Padmavati Metta, Kamala Krithivasan and Deepak Garg

This paper shows that deterministic P-timed Petri nets with inhibitory and test arcs can simulate an SN P system. A method is proposed to translate an SN P system into Petri net model and is illustrated with an example.

Feature Selection for Human Resource Selection Based on Affinity Propagation and SVM Sensitivity Analysis (#142)

Qiangwei Wang, Boyang Li and Jinglu Hu

Feature selection is a process to select a subset of original features. It can improve the efficiency and accuracy by removing redundant and irrelevant terms. Feature selection is commonly used in machine learning, and has been wildly applied in many fields. we propose a new feature selection method. This is an integrative hybrid method. It first uses Affinity Propagation and SVM sensitivity analysis to generate feature subset, and then use forward selection and backward elimination method to optimize the feature subset based on feature ranking. Besides, we apply this feature selection method to solve a new problem, Human resource selection. The data is acquired by questionnaire survey. The simulation results show that the proposed feature selection method is effective, it not only reduced human resource features but also increased the classification performance.

NaBIC SS2   Swarm Intelligence and PSO   Dec 09, 2009 15.00-17.00
Chair(s): M Koeppen and A Ghosh   Venue: F201

Particle Swarm Optimization based Corrective Strategy to Alleviate Overloads in Power System (#15)

Manoj Kumar, Maharana and Shanti Swarup K.

This paper presents a new Particle Swarm Optimization based corrective strategy to alleviate overloads of transmission lines. A Direct Acyclic Graph (DAG) technique for selection of participating generators and buses with respect to a contingency is presented. Particle Swarm Optimization (PSO) technique has been employed for generator rescheduling and/or load shedding problem locally, to restore the system from abnormal to normal operating state. The effectiveness of the proposed approach is demonstrated for different contingency cases in IEEE 57 and modified IEEE 118 bus systems. The result shows that the proposed approach is computationally fast, reliable and efficient, in restoring the system to normal state after a contingency with minimal control actions.

Syncro Germ Co-operation by Twin Swarm Intelligence for Multimodal Function Optimization (#36)

Kamalakar Bakwad, Shyam Pattnaik, B.S. Sohi, Swapna Devi, B.K. Panigrahi, Sanjoy Das and M.R. Lohokare.

This paper proposes fusion of Synchronous Bacterial Foraging Optimization (SBFO) with twin Swarm Intelligence (TSI) technique named as SBFOTSI to enhance quality of global solutions with faster convergence of multimodal functions. In this paper, initially the authors tried to increase the speed of BFO by updating bacteria positions synchronously, which is treated as SBFO. In SBFO, all the bacteria update their positions to attain global best position after completion of each generation, by adopting the feature of communication with each other. The current positions of bacteria are updated by co-operation of ePSO (Particle Swarm Optimization with extrapolation technique) and GLBestPSO (Global Local Best PSO) called as mutation operator. The mutation operator brings about diversity in the population to avoid premature convergence or getting trapped in some local optima. The SBFOTSI has more global searching ability at the beginning and improves the quality of solutions at the end of each run. The proposed technique is tested with eight standard benchmark functions and results are compared with ePSO GLBestPSO and Canonical PSO (cPSO). The experimental results on benchmark functions validate that, the proposed trifusion approach produces good quality solution with faster convergence compared to other techniques. The performance of the SBFOTSI has been tested through various statistical parameters and analysis of variance (ANOVA) test.

Fuzzy Controlled Harmonic Suppressor and Reactive Volt Ampere Compensator for Enhancing Power Quality,IS01,Applied Swarm Intelligence: A Power System Perspective (#38)
Chandra Sekhar and P.C. Panda

This paper presents and compares the performance of two controllers namely Fuzzy Logic and Proportional Integral applied to a voltage source inverter/converter operating as an active power filter. The active power filter is operated to compensate harmonics and reactive power generated by the non-linear load and power factor correction simultaneously. This work is performed in order to make an accurate comparison of fuzzy logic controller and classical control technique such as PI controller. Fuzzy control rule design is based on the general dynamic behavior of the process. A novel control method for a reactive volt–ampere compensator and harmonic suppressor system is proposed. It operates without sensing the reactive volt–ampere demand and nonlinearities present in the load. The compensation process is instantaneous, which is achieved without employing any complicated and involved control logic.

On the Design of Multiplier-less Nonuniform Filterbank Transmultiplexer Using Particle Swarm Optimization (#52)
Manoj V J and Elizabeth Elias.

In this paper design of multiplier-less nonuniform filterbank transmultiplexer (ML NUFB TMUX) is presented.
Nonuniform filter bank transmultiplexer (NUFB TMUX) is preferred when applications with different data rates are to be multiplexed. If filter coefficients can be represented in canonic signed digit (CSD) format with minimum number of signed power of two (SPT) terms, hardware complexity can be greatly reduced. Continuous coefficient NUFB TMUX is designed and particle swarm optimization (PSO) is used to synthesis filter coefficients in CSD format. Simulation results show that ML NUFB TMUX designed using the proposed algorithm has better signal to interference ratio (SIR) and frequency responses than those obtained by rounding continuous filter coefficients to the nearest CSD numbers.

Sliced Particle Swarm Optimization (SPSO); A Computationally Efficient Optimization Technique (#57)
Harish Garg, S.S. Pattnaik, Swapna Devi, K. M. Bakwad, B. K. Panigrahi and S. K Das.

A new Optimization Technique named as Sliced Particle Swarm Optimization (SPSO) is proposed. It introduces the slicing of search space into rectangular slices. It gives complete solution in terms of reduction in the computational cost, tracking minutely each sliced search space, introduces the momentum factor which restricts the particle in sliced search space and prevents the particles from flying out the search space and uses linearly decreasing inertia weight (its value changes from a larger value to a smaller one) throughout the computation process which balances between global exploration and local exploitation. The proposed algorithm is tested with benchmark functions and the results are promising.

Gray-level Image Enhancement by Particle Swarm Optimization (#121)
Apurba Gorai and Ashish Ghosh

Particle Swarm Optimization (PSO) algorithms represent a new approach for optimization. In this paper image enhancement   is considered as an optimization problem and PSO is   used to solve it. Image enhancement   is   mainly done by maximizing the information content of the enhanced image with   intensity transformation function. In the present work a parameterized transformation function is used, which uses local and global information of the image. Here an objective criterion for measuring image enhancement is used which   considers entropy and edge information of the image. We tried to achieve the best enhanced image according to the objective criterion by optimizing the   parameters used in the transformation function with the help of PSO. Results   are compared with other enhancement techniques, viz. histogram equalization,   contrast stretching and genetic algorithm based image enhancement.

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Classification System For Digital Signal Types Using Neuro Fuzzy System and PSO (#112)

Aleefia khurshid and Alhad Gokhale.

Automatic identification of digital signal types is of interest for both civil and military applications. This paper presents an efficient signal type identifier that includes a variety of digital signals. In this method, a combination of pectral and statistical features are used as an input to the classifier. Also the features are weighted based on the degree of dispersion to increase the effect of features. A fuzzy neural network with swarm intelligence (SI) for adjustment of the parameters of the network is used as a classifier. Simulation results show that the proposed method has high performance for identification of different kinds of digital signal even at very low SNRs. This high efficiency is achieved with features, which have been selected using principal component analysis and parameters using swarm optimizer.

NaBIC SS3   **Bioinformatics**   **Dec 09, 2009 15.00-17.00**

Chair(s): V Snasel and S Bortoleto   **Venue: F202**

A Pre-microRNA Classifier by Structural and Thermodynamic Motifs (#86)

Vinod Chandra S. S. and Reshmi G..

MicroRNAs (miRNAs) have been found in diverse organisms and play critical role in gene expression regulations of much essential cellular process. Discovery of miRNAs and identification of their target genes are fundamental to the study of such regulatory circuits. To distinguish the real pre-miRNA from other stem loop hairpins with similar stem loop (pseudo pre-miRNA) is an important task in molecular biology. From the analysis of experimentally proved premiRNAs, we identified 17 parameters for miRNA formation. These parameters are grouped into two categories: structural and thermodynamic properties of the pre-miRNAs. A set of feature vector was formed from the pre-miRNA-like hairpins of human, mouse and rat. A feed forward multi layer perceptron Artificial Neural Network (ANN) classifier is trained by these feature vectors. This classifier is an application program, that decide whether a given sequence is a pre-miRNA like hairpin sequence or not. If the sequence is a pre-miRNA like hairpin, then the ANN classifier will predict whether it is a real pre-miRNA or a pseudo premiRNA. The approach can classify correctly the precursors of Human Mouse and Rat, with an average sensitivity of 97.40% and specificity of 95.85%. When compared with previous approaches, MiPred, mR-abela, ProMiR and Triplet SVM classifier, current approach was greater in total accuracy.

PROSIMA: Protein Similarity Algorithm (#91)

Tom Novosad, Vaclav Snasel, Ajith Abraham and Jack Yang

In this article we present a novel algorithm for measuring protein similarity based on their three dimensional structure (protein tertiary structure). The PROSIMA algorithm using suffix tress for discovering common parts of main-chains of all proteins appearing in current NCSB Protein Data Bank (PDB). By identifying these common parts we build a vector model and next use classical information retrieval tasks based on the vector model to measure the similarity between proteins - all to all protein similarity. For the calculation of protein similarity we are using tf-idf term weighing schema and cosine similarity measure. The goal of this work to use the whole current PDB database (downloaded on June 2009) of known proteins, not just some kinds of selections of this database, which have been studied in other works. We have chose the SCOP database for verification of precision of our algorithm because it is maintained primarily by humans. The next success of this work is to be able to determine protein SCOP categories of proteins not included in the latest version of the SCOP database (v. 1.75) with nearly 100% precision.

An Analytical Approach For Tracking The Tumor Systems Dynamics (#124)

Sudipta Bhattacharya and Durjoy Majumder

Solid tumor survives by the generation of micro-vessels around it. This phenomenon is known as angiogenesis. Angiogenesis is governed by two factors, namely Tumor Angiogenic Factor (TAF) secreted by the tumor cells and tissue Fibronectin (FNT) concentration in the extra-cellular space.

These two factors help in mobilization of endothelial cells from nearby blood vessels. At the initial phase of angiogenesis, neighboring blood vessels affect in formation of capillary sprouts. In this work we have develop an analytical model to make a correlation between tumor system, vasculature system of the cancer milieu and peripheral blood circulatory system. This, in turn, could be an effective and clinically relevant approach for tracking the tumor growth and its angiogenesis with a quantitative manner.

Extraction of Interaction Information among Genes from Gene Expression Time Series Data (#179)
Debasish Datta, Amit Konar and R. Janarthana

Gene regulatory network gives the idea about the nature of interaction among the genes present in the DNA of a living species. Recently detection of gene regulatory network from gene expression data is of prime interest to the researchers. This paper considers modeling of the Gene regulatory network identification problem using a fuzzy recurrent neural network, and obtains the interaction weights among the neuron using differential evolution algorithm. A cost function is designed, the minimization of which yields the solution to the problem. In order to improve the solution further, a heuristic based local search is proposed. Computer simulation of the proposed inference algorithm revels that it is able to predict the signs of all the existing weights accurately.

Algorithms for Biological Cell Sorting with a Lab-on-a-chip (#198)
Arijit Ghosh, Rushin Shah, Arijit Bishnu and Bhargab B. Bhattacharya

Automatic cell sorting and isolation for recovery of such live cells, mostly microorganisms, is a challenging task. Lab-on-a-Chip devices implemented as cell arrays are used for this purpose. For an abstract model of the problem, we can assume the cell array to be represented by a matrix where each cell can be any of the three types: empty, good (or desired) and bad (or undesired). The problem is to separate the good and the bad cells by pushing them under electric field to their respective receptors at the corners of the cell array. We address some combinatorial optimization problems related to this biological phenomenon.

Identifying Structural Repeats in Protein using Graph Centrality Measures (#210)
Ruchi Jain, Hari Krishna Yalamanchili and Nita Parekh

Here we apply the graph-theoretic concept of Betweenness centrality to a class of protein repeats, e.g., Armadillo (ARM) and HEAT . The Betweenness of a node represents how often a node is traversed on the shortest path between all pairs of nodes i, j in the network and thus gives the contribution of each node in the network. These repeats are not easily detectable at the sequence level because of low conservation between independent repeated units, e.g., HEAT repeats are known to have less than 13% identity. Their identification at the structure level typically involves self structure-structure comparison, which can be computationally very intensive. Our analysis of a set of proteins from ARM and HEAT repeat family shows that the repeat regions exhibit similar connectivity patterns for the repeating units. Since it is generally accepted that in many networks, the larger the degree of a node, the larger the chance that many of the shortest paths will pass through this node, computing vertex Betweenness provides a simple and elegant approach for identifying tandem structural repeats in proteins.

Graph Theoretic Approach for studying correlated motions in bio-molecules (#211)
Eshita Mutt, Monika Sharma, Jyothish Soman, Kishore Kothapalli and Abhijit Mitra

Graph theoretic concepts have been applied to the dynamic cross-correlation data obtained from MD simulation of adenine riboswitch, in absence and presence of adenine. Our hybrid approach combines community detection algorithms that support edge weights and cliques. The effect of variations in the values of nearest neighbors (NN) and correlation coefficient threshold (T) in the community detection algorithm have been applied to identify and filter out coincidental correlations between rogue nodes. Our results have identified the correlations within the structural regions of the molecule, which provide strong clues regarding the functionality and stability of the molecule in absence and presence of

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adenine. Our results show that a prior application of our algorithm applied to the simulation data of bio-molecules in automated fashion can provide strong leads for hypothesis formulation and subsequent hypothesis-driven manual investigation.

NaBIC SS4 **Bioinspired algorithms** **Dec 09, 2009 15.00-17.00**

Chair(s): D Corne and S.G Ponnambalam **Venue: F203**

Bee Hive At Work: A Problem Solving, Optimizing Mechanism (#159)
Pavol Navrat, Tomas Jelinek and Lucia Jastrzembska.

A model of the bee hive that clearly separates the self-organizing decision-making behavior of the bees in the hive and the problem-specific behavior of the bees outside the hive is presented. This separation allows for the applications of the model for different problem domains. Results of the application to three
problem domains are presented - web search, function optimization and hierarchical optimization.

A Study on Automation in Peptide Computing (#181)
Sakthi Balan Muthiah.

Peptide computing is a novel way of computing that uses the interaction between peptides and antibodies as a computational model. Since several copies of peptides and antibodies can interact at the same time, this computing model is massively parallel and highly non-deterministic in nature. Due to these advantages this computational model helps us to solve some of the very hard combinatorial problems quite efficiently. Peptide computing involves preparation of peptide sequences and antibodies with respect to the given problem and it also requires the interactions between various peptide sequences and antibodies. To carry out these various operations there is a need for automation. In this paper we enumerate automation issues in peptide computing with respect to several models defined in the literature. We study and address some of the issues and propose some solution to overcome the same.

A Comparative Study of Policies in Q-Learning for Foraging Tasks (#183)
Yogeswaran Mohan and Ponnambalam S. G.

In the foraging task studied in this paper, a mobilerobot is used to search and retrieve pucks back to a home location. The goal of this study is to identify an efficient policy for q-learning which maximizes the number of pucks collected and minimizes the number of collisions in the environment. Policies namely greedy, e-greedy, Boltzmann distribution and random search are used to study their performances in the foraging task and the results are presented.

An Extensive Review of Research in Swarm Robotics (#184)
Yogeswaran Mohan and Ponnambalam S. G..

Swarm robotics is a new approach to the coordination of multi-robot systems which consist of large numbers of relatively simple robots which takes its inspiration from social insects. The most remarkable characteristic of swarm robots are the ability to work cooperatively to achieve a common goal. In this paper, classification of existing researches, problems and algorithms aroused in the study of swarm robotics are presented. The existing studies are classified into major areas and relevant sub-categories in the major areas.

DEPSO and Bacterial Foraging Optimization Based Dynamic Economic Dispatch with Non-Smooth
Fuel Cost Function (#229)
Vaisakh K, Praveena P and Rama Mohana Rao S.

The major operational decision in electric power systems is the Dynamic economic dispatch (DED). DED problem is an optimization problem with an objective to determine the optimal combination of power outputs for all generating units over a certain period of time in order to minimize the total fuel cost while satisfying dynamic operational constraints and load demand in each interval. Recently social foraging behavior of Escherichia coli bacteria has been explored to develop a novel algorithm for distributed optimization and control. The Bacterial Foraging Optimization Algorithm (BFOA) is currently gaining popularity in the community of researchers, for its effectiveness in solving certain difficult real-world optimization problems. This article comes up with a hybrid approach involving Differential Evolution Particle Swarm Optimization (PSO) and BFOA algorithm for solving the DED problem of generating units considering valve-point effects. The proposed hybrid algorithm has been extensively compared with the classical approach. The new method is shown to be statistically significantly better on two test systems consisting of five and ten generating units. The results obtained through the proposed method are compared with those reported in the literature.

Ant based supervised and unsupervised land use map generation of remotely sensed images (#74)
Anindya Halder, Susmita Ghosh and Ashish Ghosh.

The land use or land cover map depicts the physical coverage of the Earth's terrestrial surface according to its use (like vegetation, habitation, water body, bare soil, artificial structures etc.). Landuse map generation from remotely sensed images is one of the challenging task of remote sensing technology. In this article, motivated from group forming behavior of real ants, in order to automatically generate land use map from multispectral remotely sensed images, we have proposed two novel ant based (one unsupervised and one supervised) algorithms. Here the unsupervised land use map generation is treated as clustering based image segmentation problem in the multispectral space. Whereas supervised land use map generation is treated as classification task which requires some labeled pattern/pixel beforehand. Experimental results of the proposed algorithms are compared with corresponding popular state of the art techniques with various evaluation measures. Potentiality of the proposed algorithms are justified from the experimental outcome.

NaBIC SS5 Grid Computing / Cellular Automata	Dec 09, 2009 17.45-19.30
Chair(s): S Sabat and N Pillay	**Venue: EB Seminar Hall**

GRASP and Grid Computing to Solve the Location Area Problem (#155)
Sónia M. Almeida-Luz, Manuel M. Rodríguez-Hermoso, Miguel A. Vega-Rodríguez, Juan A. Gómez-Pulido and Juan M. Sánchez-Pérez

In this paper we present a new approach based on the GRASP (Greedy Randomized Adaptive Search Procedure) metaheuristic to solve the Location Area (LA) problem over a grid computing environment. All the experiments carried out to complete this study were executed in a real grid environment provided by a virtual organization of the European project EGEE. These experiments were divided into sequential and parallel executions with the intention of analyzing the behavior of the different variants of GRASP when applied to the LA problem. We have used four distinct test networks and also decided to compare the results obtained by this new approach with those achieved through other algorithms from our previous work and also by other authors. The experimental results show that this GRASP based approach is very encouraging because, with the grid computing, the execution time is much more reduced and the results obtained are very similar to those of other techniques proposed in the literature.

Job Submission to Grid using Mobile Device Interface (#73)
Sumathi Ganesan, Raghunath Rajachandrasekar, Rupak Nagarajan and Sridhar G.

Current generation grids are implemented using heterogeneous/homogeneous PCs. The conception of this paper is to do the same with mobile phones, providing ubiquitous computational power to the mobile device which off-loads the processing burden on it over to the cluster. Such architecture provides anytime-anywhere access to data and computational power. Combining Mobile computing and grid technologies could mean the ability to recreate the power of supercomputers with a mobile device, anywhere, anytime. The confluence of these two emerging trends leads to two scenarios - Treating the mobile as an interface to the grid, or using the mobile as a resource in the grid. This paper focuses on the former, given its low processing resources and data rate constraints. A proxy-based architecture is used wherein the proxy will be a personal computer which acts as the master of a centralized grid. It takes care of job-scheduling in the grid based on the availability of resources. A mobile phone submits the job to the proxy through an indigenous front-end that has been implemented using J2ME which is compatible with most mobile phones.

Load Balanced, Efficient Scheduling With and Parallel Job Submission in Computational Grids Using Parallel Particle Swarm Optimization (#277)
G Sudha Sadasivam.

Management of resource and application scheduling in a highly distributed heterogeneous Grid environment is a
complex and challenging task. Processing jobs at the grid resources in a fine grained form results in a low computation – communication ratio. This necessitates the dynamic assembly of fine grained jobs into groups of jobs before dispatching them to the resources. Recent advances in computer and network technologies have led to parallel optimization algorithms. Here a novel job grouping method using Parallel Particle Swarm Optimization (PPSO) is proposed to reduce the communication overhead, enhance the speed of completion of processes, improve resource utilization, and parallel efficiency. The proposed approach uses PPSO to group the jobs and to submit them in parallel to the grid resources. Trust based parallel job submission is also proposed to ensure security and improve on job submission time. The proposed approach has been implemented and tested by extending the features of GridSim, a simulation toolkit for grid environment.

Cellular Automata for Image Noise Filtering (#115)
P. Jebaraj Selvapeter and Wim Hordijk.

This paper presents an image noise filter based on cellular automata (CA), which can remove impulse noise from a noise corrupted image. Uniform cellular automata rules are constructed to filter impulse noise from both binary and gray scale images. Several modifications to the standard CA formulation are then applied to improve the filtering performance. For example, a random CA rule solves the noise propagation present in deterministic CA filters. A mirrored CA is used to solve the fixed boundary problem.
The performance of this CA approach is compared with the classical median filter and different switching filters in terms of peak signal to noise ratio. This comparison shows that a filter based on cellular automata provides significant improvements over the standard filtering methods.

Modeling Single Length Cycle Nonlinear Cellular Automata For Pattern Recognition (#189)
Sukanta Das, Sukanya Mukherjee, Nazma Naskar and Biplab K Sikdar.

The special class of multiple attractor cellular automaton (MACA) with single length cycles (point states) is of immense interest to the CA researchers. Such a CA can better devise solutions for pattern classification, design of associative memory, query processing, etc. The current work proposes characterization of single length cycle CA arractors with the target to model this class of CA for designing efficient pattern recognizer. Identification of essential properties of a CA while forming multi-length cycles provides the basis of such characterization. A scheme has been developed that synthesizes the single length cycle attractor CA, avoiding multi-length cycles, desired for a pattern

recognizer. Experimental results establish that the proposed CA model can effectively address the issue of pattern recognition.

NaBIC SS6	Search and Optimization	Dec 09, 2009 17.45-19.30

Chair(s): B.K. Panigrahi and G.S Mittal   **Venue: F201**

Tabu Search metaheuristic embedded in Adaptive Memory Procedure for the Profitable Arc Tour Problem (#5)
Jalel Euchi and Habib Chabchoub.

In this paper we propose a tabu search heuristic embedded in adaptive memory procedure to solve the Profitable Arc Tour Problem (PATP). The PATP is a variant of the well-known Vehicle Routing Problem in which a set of vehicle tours are constructed. The objective is to find a set of cycles in the tours of vehicle that maximize the collection of profits minus travel costs, which is in its turn subject to constraints limiting the length of cycles that profit is available on arcs.. Computational experiments show that our algorithm provides better solutions in terms quality of solution and completion processing times.

Cuckoo Search via Levy Flights (#41)
Xin-She Yang and Suash Deb.

In this paper, we intend to formulate a new metaheuristic algorithm, called Cuckoo Search (CS), for solving optimization problems. This algorithm is based on the obligate brood parasitic behavior of some cuckoo species in combination with the Levy flight behavior of some birds and fruit flies. We validate the proposed algorithm against test functions and then compare its performance with those of genetic algorithms and particle swarm optimization. Finally, we discuss the implication of the results and suggestion for further research.

Multiobjective Frequency Assignment Problem using the MO-VNS and MO-SVNS algorithms (#137)
Marisa da Silva Maximiano, Miguel A. Vega-Rodríguez, Juan A. Gómez-Pulido and Juan M. Sánchez-Pérez.

In GSM networks, the Frequency Assignment is a critical task for the mobile operators. In this paper we study different multiobjective metaheuristics to address the Frequency Assignment problem (FAP). In fact, solving optimization problems with multiple (often conflicting) objectives is, generally, a very difficult goal. This is the scenario in the FAP, where it is sought an assignment of frequencies to a number of transmitters in as efficient way as possible. The multiobjective FAP tries to minimize the number of interferences caused when a limited number of frequencies needs to be assigned to a high number of transceivers. Besides these interferences costs, the separation costs are also considered. Our approach uses a Multiobjective Variable Neighborhood Search (MO-VNS) algorithm and also its variant Multiobjective Skewed Variable Neighborhood Search (MO-SVNS). Two real-world GSM networks were used, currently being in operation, to test the presented metaheuristics.

Pre-warning Analysis in Traceability System for Food Production Supply Chain (#59)
Ke Zhang, Yi Chai, Simon X Yang and Gauri S Mittal.

Production quality in food production supply chain is studied in this paper. The deficiency of quality monitoring
existed in traceability systems is analyzed. The abnormality diagnosis algorithm, pre-warning method and pre-warning system structure are presented. The potential production abnormality of logistics unit of the whole supply chain is diagnosed and warned, and the decision support information is given. Four abnormal data types are analyzed; and standard hierarchy evaluation indicator system for abnormality is developed. A mathematical model for abnormality detection is developed by combining radial base function (RBF) neural network, fuzzy control, and statistical analysis methods. The model can accurately find different types of abnormality, especially hidden problems. Instance analysis and

simulations show that the proposed pre-warning system can effectively identify abnormality types, and accurately determine whether a warning should be issued, depending on the warning level when an abnormality is detected by the system.

Solving multiple-objective optimization problems using GISMOO algorithm (#96)
Arnaud Zinflou, Caroline Gagné and Marc Gravel.

In this paper, we proposed a new Pareto generic algorithm which hybridizes genetic algorithm and artificial immune
systems. Numerical experiments were made using a classical benchmark in multiple-objective optimization (MOKP). Results show that our approach is able to obtain better performance than two state of the art approaches: NSGAII and PMSMO.

A perspective view on Travelling Salesman Problem using Genetic Algorithm (#259)
Geetha Ramani R, Vasumathy Seenuvasan and Nishaa Bouvanasilan.

The Travelling Salesman Problem (TSP) is one of the extensively studied optimization problem. The numerous direct applications of the TSP bring life to the research area and help to direct future work. To solve this problem many techniques have been developed. Genetic algorithm is one among those which solves this problem by using the processes observed in natural evolution to solve various optimization and search problems. This paper presents a complete survey on genetic algorithm techniques proposed by researchers for solving Travelling Salesman Problem.

NaBIC SS7   Intelligent Health Systems   Dec 09, 2009 17.45-19.30

Chair(s): B.K Ane and G Schaefer   Venue:F202

Pharmaco-informatics: Predicting an Ayurvedic Treatment for Hirschsprung's Disease (#7)
Preenon Bagchi, Somashekhar R, Mahesh M and Rajesh TS.

Hirschsprung's disease, or HD, is a disease of the large intestine. Mutations in the RET gene is the cause of Hirschsprung's disease, HD. Homo sapiens ret proto-oncogene AAH04257 from NCBI database was taken for this
work. Homology modeling studies was done and 3D structure of RET protein was modeled. Tinospora is an Ayurvedic Herb. The structure of Tinospora was made and converted to Tinospora.pdb. The receptor RET protein
and the ligand Tinospora.pdb (drug) were docked.

An In-Silico approach towards remediation of Schizophrenia (#11)
Preenon Bagchi, Kalidass S and Somashekhar R.

Mutant protein hSKCa3 responsible for Schizophrenia is taken from NCBI's Entrez database; its 3D structure is determined by homology modeling. The conotoxin protein is taken from NCBI's Entrez database & its 3D structure is established. The structure of Withanolide is determined and docked with conotoxin protein; this combination is docked with hSKCa3 protein, hence establishing a remedy.

Pattern Recognition on 2D Cervical Cytological Digital Images for Early Detection of Cervix Cancer (#269)
Jeremiah Suryatenggara, Bernadetta Kwintiana Ane, Maruli Pandjaitan and Winfried Steinberg.

To date, cancer of the uterine cervix is still a leading cause of cancer-related deaths in women in the world. Papanicolau smear test is a well-known screening method of detecting abnormalities in the uterine cervix cells. In Indonesia, Pap smear test is mostly still done conventionally. Due to the small number of skilled and experienced cytologists, the screening procedure becomes time consuming and

highly prone to human errors. Coping with these issues, an automated recognition system is developed to enable automatic identification of anomaly in the cervix cells. Here, recognition of patterns inside a cervix cell is based on the cell morphological features, in terms of size, shape and color. Therefore, three parameters are employed, i.e. N/C ratio, wavelet approximation coefficients, and color intensity. Aiming at deriving reliable decision surface for the diagnosis of cervix cancer, three classification algorithms are opted for machine learning process, i.e. k-Nearest Neighbor (kNN), Support Vector Machine (SVM), and Naïve   Bayes (NB) algorithms. Based on thorough observation upon the selected parameters, it can be recognized that the   cancerous cells follow certain patterns and highly distinguishable from the normal cells.

Intelligent analysis of prostate ultrasound images (#273)
Aboul ella Hassanien, Hameed Al-Qaheri and Gerald Schaefer.

Intelligent analysis of prostate ultrasound images In this paper, we introduce an intelligent approach to analysing prostrate ultrasound images in order to diagnose prostate cancer. Algorithms based on fuzzy image processing are applied first to enhance the contrast of the original image, to extract the region of interest and to enhance the edges surrounding that region. Then, we extract features characterizing the underlying texture of the regions of interest based on concurrence matrix in wavelet domain. Finally, a rough neural network, where a neural network and rough set theory are integrated into a hybrid system, is designed for discrimination of different regions of interest to test whether they represent malignant or cases. The neural network is built from rough neurons, each of which can be viewed as a pair of sub-neurons, corresponding to the lower and upper bounds concepts of rough set theory. The experimental results obtained show that the overall classification accuracy of our approach is high**.**

Genetic Algorithm Based Automated Medical Image Fusion Technique: Comparative Study with Fuzzy Fusion Approach (#134)
Mahua Bhattacharya and Arpita Das.

Medical image fusion has been used to derive the useful information from multi modal medical images. The proposed methodology introduces soft-computing approaches for robust and automatic extraction of information from different   modality images. This fusion strategy implements multi resolution decomposition of the input images using wavelet transform. It is because, the analysis of input images at multiple resolutions extracts more fine details from the images and improves the quality of the composite fused image. The proposed approach is also independent of any manual marking or knowledge of fiducial points and starts the fusion procedure automatically. The performance of the genetic based proposed methodology is compared with another fuzzy based fusion technique using mutual information as the similarity measuring metric. Experimental results show that genetic algorithm based fusion technique improves the quality of the fused images significantly over the fuzzy approaches.

Insilico reaction kinetic model of shear stress induced eNOS activation in arterial endothelium (#201)
Dhanushya Ramachandran, Devika N.T. and Jaffar Ali B.M..

Blood vessels are constantly exposed to hemodynamic forces in the form of cyclic stretch and shear stress due to the pulsatile nature of blood flow. Endothelial cells (ECs) lining these blood vessels act as a sensing interface to transducer these hemodynamic forces or mechanical stimuli to intracellular signals. EC signaling leads to the production of Nitric Oxide (NO) that regulates the flow pressure through relaxation of smooth muscle. A theoretical frame work that captures the mechanics of vascular remodeling process along with intracellular signaling cascade can shed light in the process of adaptation and regulation of blood flow in these arteries. Towards this end, we have developed a detail mass action model of intracellular signaling, including shear induced eNOS activation, an enzyme that produces NO for signaling, leading to the regulation of NO production. We simulate shear-induced activation of eNOS in detail. We show that upon shear stimulus, concentration of increases instantly to 1.5 fold leading to increase in activeαGTP.G eNOS to two fold. We further show that our approach is modular in that various pathways constituting our model of eNOS activation and smooth muscle relaxation can be included one-by-one.

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Left Ventricular Contour Extraction from Cardiac MR Images Using CB and Random Walks Approach (#30)
Sarada Dakua and Jyotinder Sahambi.

Increasing life expectation have made the heart failures of important concern. For clinical diagnosis, parameters for the condition of heart are needed. Accurate and fast image segmentation algorithms are of paramount importance prior to the calculation of these parameters. An automatic method for segmenting the cardiac magnetic resonance (CMR) images is always desired to increase the accuracy. We prefer random walk method due to its noise robustness and unconditional approach over other segmentation algorithms. Performance of the method solely depends on the selection of initial seeds, which uses to be decided manually. But there are some hurdles while applying this method to CMR images, due to their color complexity unlike general images. So the main objective to select the number and placement of seeds automatically. We obtain this with use of cantilever beam (CB) equation in association with a variable threshold technique. The highlight of our method is its ability to succeed with minimum number of initial seeds.

NaBIC SS8 (Special Session)   Particle Swarm Optimization for Global Optimization Problems   Dec 09, 2009   17.45-19.30   Venue: F203
Chair(s): M. Pant and K. Deep

Inserting information sharing mechanism of PSO to improve the convergence of DE (#32)
Musrrat Ali and V.P. Singh.

In the present study we propose a new hybrid version of Differential Evolution (DE) and Particle Swarm Optimization (PSO) algorithms. In the proposed algorithm named as Hybrid Differential Evolution (HDE) a 'switchover constant' called α is defined. HDE starts as the basic DE algorithm which switches over to PSO when α is activated. The constant α on the other hand is activated at a point where the DE procedure usually slows down which is usually in the proximity of global optimal i.e. to say when the search domain is contracted around the global optimal. Experimenting with a test bed of 12 benchmark functions, we show the promising nature of the proposed HDE algorithm.

Optimization of Directional Overcurrent Relay Times Using Laplace Crossover Particle Swarm Optimization (LXPSO) (#24)
Kusum Deep and Jagdish Chand Bansal.

An important problem in electrical engineering is to determine the optimal directional overcurrent relay times. The problem is modeled as a constrained nonlinear continuous optimization problem in which the decision variables are the devices that control the act of isolation of faulty lines from the system without disturbing the healthy lines. Two models are considered namely IEEE-3 bus system and IEEE-4 bus system. The optimization methodology is the Laplace Crossover Particle Swarm Optimization (LXPSO), which has recently been introduced by the authors. LXPSO uses a new information sharing strategy amongst the particles of the swarm using a new crossover, called Laplace Crossover (LX), based on Laplace distribution. The results obtained by LXPSO are compared with the results available in the literature. It is shown that LXPSO is able to provide superior results in terms of optimality and reliability in comparison to other methods

A New Diversity Guided Particle Swarm Optimization with Mutation (#1)
Radha Thangaraj, Millie Pant and Ajith Abraham.

This paper presents a new diversity guided Particle Swarm Optimization algorithm (PSO) named Beta Mutation PSO or BMPSO for solving global optimization problems. The BMPSO algorithm makes use of an evolutionary programming based mutation operator to maintain the level of diversity in the swarm population, thereby maintaining a good balance between the exploration and exploitation phenomena and preventing premature convergence. Beta distribution is used to perform the mutation in the proposed BMPSO algorithm. The performance of the BMPSO algorithm is investigated on a set of ten

standard benchmark problems and the results are compared with the original PSO algorithm. The numerical results show that the proposed algorithm outperforms the basic PSO algorithm in all the test cases taken in this study.

Optimal concurrent dimensional and geometrical tolerancing based on evolutionary algorithms (#33)
Sivakumar.K, Balamurugan.C, Ramabalan.S and Venkata raman.S.B.

A general new methodology using evolutionary algorithm viz., Elitist Non-dominated Sorting Genetic Algorithm (NSGA-II) and Multi Objective Particle Swarm Optimization (MOPSO) for obtaining optimal tolerance allocation and alternative process selection for mechanical assembly is presented. The problem has a multi-criterion character in which 3 objective functions, 6 constraints and 11 variables are considered. The average fitness membership function method is used to select the best optimal solution from Pareto optimal fronts. Two multi-objective performance measures namely solution spread measure and ratio of non-dominated individuals are used to evaluate the strength of Pareto optimal fronts. Two more multiobjective performance measures namely optimizer overhead and algorithm effort are used to find computational effort of the NSGA-II and MOPSO algorithms. The Pareto optimal fronts and results obtained from various techniques are compared and analysed. Both NSGA-II and MOPSO are best for this problem.

Parallel Artificial Bee Colony (PABC) Algorithm (#11)
Harikrishna Narasimhan.

The artificial bee colony (ABC) algorithm is a metaheuristic algorithm for numerical optimization. It is based on the intelligent foraging behavior of honey bees. This paper presents a parallel version of the algorithm for shared memory architectures. The entire colony of bees is divided equally among the available processors. A set of solutions is placed in the local memory of each processor. A copy of each solution is also maintained in a global shared memory. During each cycle, the set of bees at a processor improves the solutions in the local memory. At the end of the cycle, the solutions are copied into the corresponding slots in the shared memory and made available to all other bees. It is shown that the proposed parallelization strategy does not degrade the quality of solutions obtained, but achieves substantial speedup.

Robust Prediction of Stock Indices using PSO based Adaptive Linear Combiner (#19)
Ritanjali Majhi, Ganapati Panda and Babita Majhi.

The present paper employs a particle swarm optimization (PSO) based adaptive linear combiner for efficient prediction of various stock indices in presence of strong outliers in the training data. The connecting weights of the model are updated by minimizing the Wilcoxon norm of the error vector by PSO. The short and long term prediction performance of the new model is evaluated with test data and the results obtained are compared with those obtained from the conventional PSO based model. It is in general observed that the proposed model is computationally more efficient, prediction wise more accurate and more robust against outliers in training set compared to those obtained by standard PSO based model.

Multi-Colony Parallel Ant Colony Optimization on SMP and Multi-Core Computers (#8)
Pierre Delisle, Marc Gravel and Michaël Krajecki.

The purpose of this paper is to propose an effective implementation of the Ant Colony Optimization metaheuristic on actual shared-memory parallel computers. We deal with the management of multiple colonies which use a global shared-memory to exchange information. We report considerable speedups on a SMP node of multi-core processors while witnessing solution quality equal or greater than the original sequential implementation.

Chair(s): J. Dvorsky and K. Deep

Evolving Colors in User Interfaces by Interactive Genetic Algorithm (#258)
Cosimo Birtolo, Paolo Pagano and Luigi Troiano.
Color selection in designing user interfaces is addressed by an Interactive Genetic Algorithm. The proposed
approach is aimed at finding the optimal trade-off between different and sometimes conflicting constraints, without any explicit model of user preferences and abilities. Experimentation investigates the algorithm convergence
under several conditions and user behavior.

Efficient Design of Pulse Compression Codes Using Multiobjective Genetic Algorithm (#65)
Ajit Kumar Sahoo, Ganapati Panda and Pyari Mohan Pradhan.

Binary sequences having good a periodic autocorrelation functions (ACFs) with low range sidelobes are required
for many communication applications. However, few such good binary sequences are available having large
sequence length. In this paper nondominated sorting genetic algorithm-II(NSGA-II) is used to generate biphase pulse compression codes from length 49 to 100. Pulse compression technique avoids the transmission of a signal having small pulse width and high peak power for better range resolution. The efficiency of these codes depends upon the energy   Content in the range sidelobes of their autocorrelation functions. Peak sidelobe level (PSL) and integrated side lobe level (ISL) are the two performance measures for pulse compression codes. In this paper the multi objective problem is designed by taking PSL and ISL as the objective functions.

A Genetic Algorithm based Peer Selection Strategy for BitTorrent Networks (#126)
Tiejun Wu, Maozhen Li, Mahesh Ponraj and Man Qi.

BitTorrent has emerged as an effective peer-to-peer application for digital content distribution in the Internet. However, selecting peers in BitTorrent for efficient content distribution still poses a number of challenges due to high heterogeneities of peers with varied rates of uploading bandwidth and dynamic content. This paper presents GA-BT, a genetic algorithm based peer selection optimization strategy for efficient content distribution in BitTorrent networks taking into account both the uploading bandwidth of peers and the availability of content among peers. GA-BT employs the divisible load theory to dynamically predict optimal fitness values to speed up the convergence process in producing optimal or near optimal solutions in peer selection. A BitTorrent simulator is implemented for GA-BT performance evaluation, and the experimental results show the effectiveness of GA-BT in peer selection optimization.

Finding Stable Conformations of Small molecules using Real Coded Genetic Algorithm (#197)
Shashi Barak, Kusum Deep and V.K Katiyar.

In this paper we have used a real coded genetic algorithm for finding the global minimum energy conformation of two small molecules viz. Pseudoethane and 1,2,3-trichloro-l-fluoro-propane based on a potential function. Finding the global minimum of this function is very difficult because it has a large number of local minima, which grows exponentially with molecule size. Computational results are obtained using a real-coded genetic algorithm. The obtained results show a remarkable performance as compared to the earlier published results.

Searching Co-Integrated Portfolios by a Genetic Algorithm (#261)
Pravesh Kriplani and Luigi Troiano.

Searching for portfolios co-integrated with an index offers new opportunities in designing robust investment strategies. The problem of finding optimal index co-integrated portfolios that are maximally stationary is combinatorial. Indeed, given a basket of equities, the portfolio/index co-integration cannot be simply expressed in terms of equity/index co-integration. In this paper we investigate the application of simple genetic algorithms in finding optimal portfolios.

Searching for Quasigroups for Hash Functions with Genetic Algorithms (#12)
Vaclav Snasel, Ajith Abraham, Jiri Dvorsky, Eliska Ochodkova, Jan Platos and Pavel Kromer.

Artificial Neural Networks (ANN) and Fuzzy systems are the widely preferred artificial intelligence techniques for biological computational applications. While ANN is less accurate than fuzzy logic systems, fuzzy theory needs expertise knowledge to guarantee high accuracy. Since both the methodologies possess certain advantages and disadvantages, it is primarily important to compare and contrast these two techniques. In this paper, these two techniques are analyzed in the context of MR brain tumor image segmentation. Real time abnormal MR brain images are used in this work. A comprehensive feature vector is formed from these images. An optimization algorithm is used to select the significant features. These features are used to train the representative of neural networks namely Linear Vector Quantization (LVQ) network and the Fuzzy C-means (FCM) algorithm which belongs to the category of fuzzy systems. An extensive analysis and comparison is performed in terms of segmentation efficiency and convergence time period. Experimental results show promising results for the neural classifier over the fuzzy classifier in terms of the performance measures.

NaBIC SS10	Hybrid Systems	Dec 10, 2009 14.00-16.00
Chair(s): M Koeppen and G Panda		**Venue: F202**

Double Circuit Transmission Line Fault Distance Location using Artificial Neural Network (#67)
Anamika Jain, A.S. Thoke and R. N. Patel.

Distance relays used for protection of transmission lines have problems of under-reach, over-reach & mal-operation due to the high impedance fault. Further the problem is compounded when the distance relays are used for protection of double circuit transmission lines, due to effect of zero sequence mutual coupling. Different types of faults in a transmission line need to be located correctly. This paper presents a single neural network for fault distance location of ten different types of faults in both the circuits of a double circuit transmission line fed from sources at both the ends. This technique uses only one end data and accurate fault distance location is achieved after one cycle from the inception of fault. The proposed Artificial Neural Network (ANN) based Fault Distance Locator uses fundamental components of 3-phase current signals of both the circuits and 3-phase voltage to learn the hidden relationship in the input patterns. An improved performance is obtained once the neural network is trained suitably for different system parameters and conditions, namely, varying fault type, fault location, fault resistance, fault inception angle, presence of mutual coupling and remote source infeed.

Sample selection of microarray data using Rough-Fuzzy based approach (#218)
Amit Paul and Jaya Sil.

Though DNA microarray technology simultaneously measures the expression levels of   thousands of genes, it has been observed that a few underlying gene features may account for significant data variation in gene classification problems. Selection of input features play key role in predicting an outcome, therefore, should be determined from the huge data sets with great importance for successful applications. Rough set theory (RST) has been used recently for dimension reduction of data; however, existing methods are inadequate to finding minimal reduct. The paper proposes a RST based technique, applied on gene expression data for dimension reduction by obtaining single reduct in one

pass. Therefore reducing time complexity compare to the existing methods. The samples of different genes are considered as conditional attributes while the gene expression data represent the value of the attributes. The gene expression data are discretized using linguistic terms with proper semantics and represented by fuzzy sets. The discretized values are calculated using Gaussian membership function with varied mean and standard deviation in order to eliminate the ambiguity between different linguistic terms. The genes are classified by generating decision attributes depending on the frequency of attribute value. The discritization and classification are performed simultaneously, which further reduces the time complexity of the procedure. The proposed framework selects the significant features, introducing importance factor of each sample of the genes determining their significance to a particular class. Most significant samples are only selected for gene classification, resulting dimension reduction. Proposed method exhibits no variation with experimental microarray gene information unlike other existing methods.

Association Rule Mining Using Multi-objective Genetic Algorithms: Strengths and Challenges (#223)
Rajul Anand, Abhishek Vaid and Pramod K. Singh.
Association rule mining based on support and confidence generates a large number of rules. However, post analysis is required to obtain interesting rules as many of the generated rules are useless. We pose mining association rules as multi-objective optimization problem where objective functions are rule interestingness measures and use NSGA-II, a well known multi-objective evolutionary algorithm (MOEA), to solve the problem. We compare our results vis-à-vis results obtained by a traditional rule mining algorithm – Apriori and contrary to the other works reported in the literature clearly highlight the quality of obtained rules and challenges while using MOEAs for mining association rules. Though none of the algorithm emerged as clear winner, some of the rules obtained by MOEA could not be obtained by traditional data mining algorithm. We treat the whole process from data mining perspective and discuss the pitfalls responsible for relatively poor performance of the MOEA which has been shown as a good performer in other paradigms.

Differential Evolution Particle Swarm Optimization Algorithm for Reduction in Network Power
Loss and Voltage Instability (#230)
Vaisakh K, Sridhar M and Linga Murthy K S.

This article introduces an differential evolution particle swarm optimization (DEPSO) method for dealing with optimal reactive power dispatch aiming at power loss reduction. The optimum reactive power dispatch of power systems is to allocate reactive power control variables so that the objective function composed of power losses is minimized and the prescribed voltage limits are satisfied. The proposed method determines the optimum settings of reactive power control variables such as, generator excitation, tap changing transformers, and SVC that reduces the power loss , while maintaining the voltage stability. Mathematically, the problem of this research is a nonlinear programming problem with integer variables. This article presents a new approach that employs the AODE algorithm to solve the problem. IEEE-30 bus test system from the literature is used to exemplify the performance of the proposed method. Numerical results show that the proposed method is better than the other methods.

An Adaptive Neuro-Fuzzy Based Speed Sensorless Induction Motor Drives (#271)
R. A. Gupta, Rajesh Kumar and Rajesh Shankarrao Surjuse.

A new algorithm for speed observer based on Model Reference Adaptive System (MRAS) is proposed for high performance induction motor drive. It uses stator current error based MRAS speed observer. The reference model of the stator current error based MRAS is the measured stator current components and the adaptive model is neuro-fuzzy based stator current observer. The adaptive model also needs the use of rotor flux. This rotor flux is estimated by neural network based rotor flux observer. Since both the reference model and the adaptive model are free from the use of pure integrator, there will not be any problem of saturation and d.c. drift in the observed state variables. Also the neuro-fuzzy based stator current MRAS speed observer is insensitive to parameter variations. Five tests are performed which shows effectiveness of the proposed scheme. The results shows faster and better response of indirect vector controlled induction motor drive system with neuro-fuzzy based stator current MRAS speed observer.

KMSCD: Knowledge Management System for Crop Diseases (#18)
Savita Kolhe, Raj Kamal, Harvinder S. Saini and Girish Kumar Gupta

This paper presents a knowledge management system for crop disease (KMSCD). This system aims to provide a good knowledge management tool for efficient knowledge acquisition, storage, knowledge engineering, processing and proper maintenance of knowledge that can be ultimately used by the diagnostic expert system (ES). The system is developed using ASP.NET web-application framework provided in Microsoft Visual Studio. NET. The source code is written using C#. The dynamic knowledge base is implemented using SQL server. The system presently works for the knowledge management of 25 prevalent diseases of three major oilseeds crops of India viz. soybean, groundnut and rapeseed mustard. The adopted development methodology and the experience acquired in the knowledge engineering and development of knowledge management system for crop disease are discussed in this paper.

NaBIC SS11   Pattern Recognition/ Document and Text Analysis   Dec 10, 2009
                                                                    14.00-16.00   Venue: EB Seminar Hall
Chair(s):   P Dasgupta and S Ionita
An Empirical Study of Conserved Self Pattern Recognition Algorithm By Comparing to Other One-Class Classifiers and Evaluating With Various Random Number Generators (#157)
Senhua Yu and Dipankar Dasgupta.

The early work has demonstrated that Conserve Self Pattern Recognition Algorithm (CSPRA) produces promising performance in the field of anomaly detection. This paper further presents the applications of CSPRA to Fisher's Iris data, Indian Telugu data and Wisconsin breast cancer data. A formal description of the difference between two detection strategies (Classical CSPRA and Balanced CSPRA) is given. The comparative study of CSPRA to other one-class classifiers (NSA, V-detector and One-class SVM) shows that the performance of the CSPRA is obviously better. This paper also investigates the influence of various random number generators on the performance of the CSPRA and NSA. Our experiments indicates that n006Fn-uniform random number generators tend to produce worse performance than uniform random number generators and quasi-random number generator has the potential to enhance the system performance compared to other uniform random number generators.

Hyper-heuristic Decision Tree Induction (#186)
Alan Vella, David Corne and Chris Murphy.

Hyper-heuristics are increasingly used in function and combinatorial optimization. Rather than attempt to solve a problem using a fixed heuristic, a hyper-heuristic approach attempts to find a combination of heuristics that solve a problem (and in turn may be directly suitable for a class of problem instances). Hyper-heuristics have been little explored in data mining. Here we apply a hyper-heuristic approach to data mining, by searching a space of decision tree induction algorithms. The result of hyper-heuristic search in this case is a new decision tree induction algorithm.
We show that hyper-heuristic search over a space of decision tree induction rules is able to find decision tree induction algorithms that outperform many different version of ID3 on unseen test sets.

Automatic Extraction of Events from Textual Requirements Specification (Computing with Words) (#71)
Sandeep Singh, Sangeeta Sabharwal, JP Gupta and Reetesh Gupta

Events give important information about the behavior of a system in a summarized form. In the past, events have played an important role in breaking the functional requirements of the system in the "Event Partitioning Approach". Our previous work has shown that Events can be a starting point in Object-Oriented Analysis of requirements. Every event triggers a Use Case in the system, hence should get a priority in identifying and analyzing requirements over Use Cases. In any system there is plethora of events happening, some are important to be recorded, while others are to be ignored. Moreover, there are various perspectives to define events. Thus, it becomes important to have an

automated process that could help not only in extracting events but also analyze and classify them into various types. A study on various existing event extraction tools shows that they are either domain specific or take events as actions that occur at a particular time. There is no tool which extracts events that represent system behavior and at the same time gives a result that can be reused for application in multiple domains. This paper presents, a domain independent tool, developed in JAVA that automates the process of Extraction, Analysis and Classification of Events from Textual Requirements, expressed in English as a Natural Language. This tool also assists the analysts in further refining of events identified or to add some new events relevant to application domain. Tool has been tested on several case studies from different domains and has given very promising results.

A Spatial Approach to Perception Identification in Editorials (#108)
Supraja Jayakumar.

A method is proposed to annotate editorials and news articles for sentences that most accurately represent the opinion of the speaker towards the issue. The speaker's point of view or level of discernment of the issue is whittled out. A list of informative and related keywords is extracted from the document based on their frequency of occurrence. Subsequently, pronominal anaphora is resolved at the document level based on minimum distance measures. Normalized Google Distance (NGD) is employed to resolve appositive instances. The Vector Space Model is then applied to the anaphora resolved document. Based on distance measures in high dimensional space, the cohesion between target word pairs is observed. Strongly cohesive word clusters qualify as opinion words. Results from a pilot collection of short opinion editorials and critical reviews from newspapers and manual annotation of perspective of up to 710 such sentences indicate an agreement of 76% in opinion annotation.

An Application of Bayesian Networks in Predicting Form Entries (#260)
Luigi Troiano, gennaro cirillo, Cosimo Birtolo and Roberto Armenise.

In this paper we propose a model, based on Bayesian Inference, aimed at predicting the user input according to past interactions. We exploited this approach to prototype an innovative online payment system in Poste Italiane. Preliminary experimental results outline that this approach is feasible and may improve usability and user experience more in general.

NaBIC SS12   **Finance / Differential Evolution**   **Dec 10, 2009 14.00-16.00**

Chair(s): H Takagi and G A V Pai   **Venue: F203**

Discovering Effective Technical Trading Rules with Genetic Programming: Towards Robustly Outperforming Buy-and-Hold (#256)
Dome Lohpetch and David Corne.

Genetic programming is now a common research tool in financial applications. One classic line of exploration is their use to find effective trading rules for individual stocks or for groups of stocks (such as an index). The classic work in this area (Allen & Karjaleinen, 99) found profitable rules, but which did not outperform a straightforward "buy and hold" strategy. Several later works report similar outcomes, while a small number of works achieve out-performance of buy and hold, but prove difficult to replicate. We focus here on indicating clearly how the performance in one such study (Becker & Seshadri, 03) was replicated, and we carry out additional investigations which point towards guidelines for generating results that robustly outperform buy-and-hold. These guidelines relate to strategies for organizing the training dataset, and aspects of the fitness function.

A New Model for Credit Approval Problems: A Quantum-Inspired Neuro-Evolutionary Algorithm with Binary-Real Representation (#245)
Anderson Pinho, Marley Vellasco and André Cruz.

This paper presents a new model for neuro-evolutionary systems. It is a new quantum-inspired evolutionary algorithm with binary-real representation (QIEA-BR) for evolution of a neural network. The proposed model is an extension of the QIEA-R developed for numerical optimization. The Quantum-Inspired Neuro-Evolutionary Computation model (QINEA-BR) is able to completely configure a feed-forward neural network in terms of selecting the relevant input variables, number of neurons in the hidden layer and all existent synaptic weights. QINEA-BR is evaluated in a benchmark problem of financial credit evaluation. The results obtained demonstrate the effectiveness of this new model in comparison with other machine learning and statistical models, providing good accuracy in separating good from bad customers.

Constrained Portfolio Rebalancing with Transaction Costs using Evolutionary Wavelet Hopfield Network Strategy (#248)
N.C Suganya and G.A Vijayalakshmi Pai.

Portfolio rebalancing problem is an extension of the basic portfolio optimization problem in which invested portfolio is rebalanced by incurring proportional transaction costs. The constraints included in this problem formulation are basic, cardinality, bounding and class constraints. Due to complex constraints, the solution to the problem has been beyond the reach of traditional methods. Hence, heuristic approaches have been sought for its solution. In this paper, the empirical covariance matrix, which is one of the primary inputs to the constrained portfolio rebalancing problem, is initially de-noised using wavelet shrinkage de-noising technique for proper estimation of risk. Secondly, cardinality constraint is eliminated by employing k-means cluster analysis. Finally, the proposed Evolutionary Wavelet Hopfield Network Strategy (EWHNS) with weight standardization procedures is employed to solve a class of portfolio rebalancing problem. EWHNS reports faster convergence and efficiently handles diversification in both large and small portfolios. Experimental studies of EWHNS on newly proposed portfolio rebalancing problem have been undertaken on the Bombay Stock Exchange, India (BSE200 index, period: July 2001 - July 2006) and Tokyo Stock Exchange, Japan (Nikkei225 index: period: March 2002 -March 2007) data sets and the results are compared with those obtained using Evolutionary Hopfield Network strategy (EHNS), the only existing alternative solution strategy for this proposed model. Finally, Data envelopment analysis (DEA) is also carried out to prove the efficiency of EWHNS over EHNN.

A Simple Adaptive Differential Evolution Algorithm (#87)
Radha Thangaraj, Millie Pant and Ajith Abraham.

Differential Evolution (DE) is a simple and efficient scheme for global optimization over continuous spaces. DE is generally considered as a reliable, accurate, robust and fast optimization techniques. It outperforms many other optimization algorithms in terms of convergence speed and robustness over common benchmark problems and real world applications. However, the user is required to set the values of the control parameters of DE for each problem. Such parameter tuning is a time consuming task. In this paper, a new Differential Evolution algorithm based on Adaptive Control parameters (ACDE) is introduced. The performance of ACDE algorithm is investigated with ten standard benchmark problems and the results are compared with the classical DE algorithm in terms of average fitness function value, number of function evaluations, convergence time and success rate. The numerical results show that the ACDE algorithm outperforms the classical DE in terms of all considered performance measures.

A Comparative Performance Analysis of Differential Evolution and Dynamic Differential Evolution Variants (#164)
G. Jeyakumar and C. Shunmuga Velayutham.

In this paper we present an empirical, comparative performance, analysis of fourteen variants of Differential Evolution (DE) and Dynamic Differential Evolution (DDE) algorithms to solve unconstrained global optimization problems. The aim is to compare DDE, which employs a dynamic evolution

mechanism, against DE and to identify the competitive variants which perform reasonably well on problems with different features. The fourteen variants of DE and DDE are benchmarked on 6 test functions grouped by features – unimodal separable, unimodal nonseparable, multimodal separable and multimodal non-separable. The analysis identifies the competitive variants and shows that DDE variants consistently outperform their classical counterparts.

Differential Evolution and Swarm Intelligence techniques for
Analog Circuit Synthesis (#166)
Samrat L. Sabat, Shravan kumar and Siba K. Udgata.

This paper presents an application of different variations of Differential Evolution (DE) and swarm intelligence techniques for analog circuit synthesis. A CMOS Miller Operational Trans-conductance Amplifier (OTA) that satisfies certain design specifications is designed as a case study. Two powerful and popular swarm intelligence techniques namely Artificial Bee Colony (ABC) and Particle Swarm Optimization (PSO) are used for this problem. The optimization of CMOS parameters are carried out using evolutionary algorithms in MATLAB interfaced with WINSPICE circuit simulator. Chaotic DE algorithms are used for performance comparison along with ABC and PSO. The results show that all the three evolutionary techniques are capable of designing the Miller OTA satisfying most of the design specifications. However Chaotic DE algorithm performs better in terms of quality of solution, robustness and computational time as compared to general DE, PSO and ABC algorithms.

Paired Comparisons-based Interactive Differential Evolution (#194)
Hideyuki Takagi and Denis Pallez.

We propose Interactive Differential Evolution (IDE) based on paired comparisons for reducing user fatigue and evaluate its convergence speed in comparison with Interactive Genetic Algorithms (IGA) and tournament IGA. User interface and convergence performance are two big keys for reducing Interactive Evolutionary Computation (IEC) user fatigue. Unlike IGA and conventional IDE, users   of the proposed IDE and tournament IGA do not need to compare whole individuals each other but compare pairs of individuals, which largely decreases user fatigue. In this paper, we design a pseudo-IEC user and evaluate another factor, IEC convergence performance, using IEC simulators and show that our proposed IDE converges significantly faster than IGA and tournament IGA, i.e. our proposed one is superior to others from both user interface and convergence performance points of view.

NaBIC SS13 **Communication Networks** **Dec 10, 2009 17.15 - 19.00**
Chair(s): S. Sankaranarayana and B.K. Panigrahi **Venue: EB Seminar Hall**

Modified BBO and Calculation of Resonant Frequency of Circular Microstrip Antenna (#72)
M.R. Lohokare, S.S. Pattnaik, Swapna Devi, B.K. Panigrahi, K.M. Bakwad and J.G. Joshi

In this paper, the authors propose a new evolutionary optimization technique i.e. Modified Biogeography-Based Optimization (MBBO). This technique is an improved version of BBO with each solution is directly encoded by floating point. BBO is a new bio-inspired and population based optimization algorithm for global optimization. The exploitation ability of BBO method is good but it lacks in exploration ability. The convergence of original BBO to the optimum value is slow. MBBO enhances computational throughput and global search capability for optimization of multimodal and high dimensional functions. In MBBO, the original BBO is modified by applying the concept of Mutation as extended migration in mutation scheme. Due to this concept of sharing of the information from best solution, increase the diversity among the population limited to the near feasible solution. This makes faster convergence of the algorithm. The proposed technique is validated on thirteen benchmark functions. The results of MBBO is compared with BBO and different existiong methods, which includes multimodal and high dimensional functions. MBBO is used as soft computing tool for calculating resonant frequency of circular microstrip antennas.

Profile Based Mobility Model in Vehicular Ad- Hoc Networks (#88)
Brijesh Kumar Chaurasia, Ajit Jaiswal, Geetam Singh Tomar and Shekhar Verma

This papers presents a profile based modeling method for generation of realistic mobility pattern for vehicles. The profile of the motion of vehicles follows a Gaussian distribution. The motion of vehicles has Gaussian profile with different parameters. A driver, first, selects the source, destination and his path and then, selects a profile accordingly. This paper also addresses the issues of lane changing, overtaking, selection of profile based speed that are dependent on road, node density, destination time etc. The simulation results shows that profile based model is able to generate realistic and smooth mobility pattern. Moreover, the model is able to accurately generate the driver behavior during lane changing, at traffic lights etc.

Optimizing the reliability of Communication Network using specially designed Genetic Algorithm (#154)
Anoj kumar, krishn mishra and Arun Kumar Mishra

All areas relating to telecommunications, electricity distribution, and gas pipeline require Topological optimization. It also has a major importance in the computer communication industry, when considering network reliability. In this paper, we have used GA with specialized encoding, initialization, local search operators with specially designed crossover operator called alternating crossover [21] to optimize the design of communication network topologies, as this NP-hard problem is often highly constrained so random initialization and standard genetic operators usually generate infeasible networks

Monitoring Patient Health using Policy based Agents in Wireless Body Sensor Mesh Networks (#9)
Kevin Miller and Suresh Sankaranarayanan

There is presently considerable research interest in using wireless and mobile technologies in patient health monitoring particularly in hospitals and nursing homes. For health monitoring,, an intelligent agent based hierarchical architecture has already been published by one of the authors of this paper. Also, the technique of monitoring and notifying the health of patients using an intelligent agent, to the concerned hospital personnel, has also been proposed. We now present the details of the functioning of four main intelligent agents, viz., the nurse agent, the sensor agent, the database agent and the ward boy agent, for intimating the health information to the concerned doctor in the hospital, based on certain policies relevant to the hospital. The policies, in our case have been worked out based on the temperature parameter monitored by the "nurse agent". We have considered just as an example, the physiological parameter viz., the body temperature monitoring, for our policy based agent implementation. The implementation has been carried out using JADE-LEAP agent development kit. The details are presented in the paper.

NaBIC SS14   Character & Handwriting Recognition / Biometrics
                                  Dec 10, 2009   17.15 - 19.00   Venue: F201
Chair(s): A Bandyopadhyay and S.M Shamsuddin

On Formulating a Probability of Random Correspondence of Biometrics Using Error Exponents (#37)
Jay Bhatnagar, Brejesh Lall and R K Patney

Performance of biometrics in human authentication can be limited when multiple samples of a user's biometric information differ due to intra-class variability in acquisition, storage or transmission of biometrics. Thus, random correspondence results between users. We formulate Probability of Random Correspondence (PRC) by developing an information model of biometrics features as a noisy source. The information in features represented by Ns bits inherently has t error bits attributed to the intra-class variabilities. The values of t and bit error probability are shown to be determined from second order statistics of the features. These are used respectively, to formulate information rate of the noisy biometric and to characterize a binary symmetric channel that models the occurrence of errors in a

biometric template. Finally, information rate and error probability are combined in the framework of error exponents to formulate PRC of biometrics. We illustrate our approach with simulations, using freely available data, to obtain numerical values of PRC of fingerprint biometrics.

Development of Online Handwriting Recognition System: A Case Study with Handwritten Bangla Character (#274)
Asok Bandyopadhyay and Basabi Chakraborty

Developing efficient handwriting recognition systems that are fast and highly reliable is a challenging problem. This work represents the development of an online handwriting recognition system for Bangla script, widely used in eastern India and Bangladesh. In our approach, an online handwritten character/cluster is characterized by structure or shape based representation of a stroke in which a stroke is represented as a string of shape features. Using this string representation, an unknown stroke is identified by comparing it with a database of strokes using DTW (Dynamic Time Warping) technique. Identifying all the component strokes recognizes a full character. A recognition experiment has been conducted with a total of 495 classes on 20,873 data samples and 10 people as data contributors yielding 97.33% recognition rate with 2.18%misrecognition rate and 0.5% rejection rate.

Zone-Based Hybrid Feature Extraction Algorithm for Handwritten Numeral Recognition of Two Popular Indian Scripts (#127)
Rajashekararadhya S. V and Vanaja Ranjan P.

India is a multi-lingual multi-script country, where eighteen official scripts are accepted and there are over hundred regional languages. In this paper we propose a zone- based hybrid feature extraction algorithm scheme towards the recognition of off-line handwritten numerals of two popular south-Indian scripts. The character centroid is computed and the character/numeral image (50x50) is further divided in to 25 equal zones (10x10). An average distance from the character centroid to the pixels present in the zone column is computed. This procedure is sequentially repeated for all the zone/grid/box columns present in the zone (10 features). There could be some zone column having empty foreground pixels. Hence feature value of such zone column in the feature vector is zero. This procedure is sequentially repeated for the entire zone present in the numeral image (250 features). Similarly we extract zone centroid coordinates as features. The numeral image is divided into 50 equal zones (5x10). The zone centroid is computed. This procedure is sequentially repeated for the entire zone present in the numeral image (100 features). There could be some zone having empty foreground pixels. Hence feature value of such zone in the feature vector is zero. Finally 350 such features are extracted for classification and recognition. The nearest neighbor and the support vector machine classifiers are used for subsequent classification and recognition purpose. We obtained 97.75 % and 93.9 % of recognition rate for Kannada and Tamil numerals respectively using nearest neighbor classifier. We obtained 98.2 % and 94.9 % of recognition rate for Kannada and Tamil numerals respectively using support vector machine classifier.

Image processing Algorithms for Improved Character Recognition and Components Inspection (#131)
Anima Majumder

The importance of inspection process has been magnified by the requirements of the modern manufacturing environment. A variety of approaches for automatic inspection of machine parts have been reported over last two decades. In this work it is targeted to develop an automated machine vision software system, which is used to inspect automotive parts like PE pumps after assembly of different components. Inspection is carried out to detect missing components, misalignment of components and out of tolerance of components. This work proposes some methodologies for Optical Character Recognition (OCR) and feature extraction. An improved Local Mean -Gradient thresholding algorithm[1] is proposed and implanted to recognize the characters like type number and serial number printed on the automotive parts like PE-PUMP, irrespective of the variation in background colors, industrial noises like dust particles, oily surfaces etc. The proposed methodologies have been implemented and explained here with some generic examples which overcome various industrial constraints. In this work, it is proved that automatic selection of threshold based on the background colors has improved

the OCR performance to 100% recognition. The second part focuses on the extraction of suitable features in order to obtain a good pattern matching result even under various industrial constraints.

NaBIC SS15   Fuzzy Systems/ Data Mining and Information Retrieval
                                                        Dec 10, 2009 17.15 - 19.00 Venue: F202

Chair(s): Roger Marshall and A. Jain

PSO Tuned Combined Optimal Fuzzy Controller for AGC of Two Area Interconnected Power System (#70)
S.K. Sinha, R. N. Patel and R. Prasad

In this work Automatic Generation Control (AGC) of two-area interconnected power system has been studied using PSO tuned combined optimal fuzzy controller. As a consequence of continual load variation, the frequency and tie-line power deviate over time and these transients are to be minimized using different controllers. A combined optimal fuzzy controller has been designed and proposed to ascertain zero steady state frequency deviation and tie-line power flow deviation under all operating conditions. The proposed controller has been obtained by feeding the output of the optimal controller to a fuzzy controller. Particle Swarm Optimization (PSO) technique has been used to optimize the parameters of the fuzzy controller. The performance of the proposed controller has been compared with that of a combined optimal fuzzy controller whose parameters are not optimized. The simulation results indicate that better control performance in terms of overshoot and settling time can be obtained by the PSO tuned combined optimal fuzzy controller

Short Term Load Forecasting using Fuzzy Adaptive Inference and Similarity (#36)
Amit Jain, E. Srinivas and Rasmimayee Rauta

The main objective of short term load forecasting (STLF) is to provide load predictions for generation scheduling, economic load dispatch and security assessment at any time. Thus, STLF is needed to supply necessary information for the system management of day-to-day operations and unit commitment. This paper presents a forecasting method based on similar day approach in conjunction with fuzzy rule-based logic. To obtain the next-day load forecast, fuzzy logic is used to modify the load curves on selected similar days. A Euclidean norm considering weather variables such as 'temperature' and 'humidity' with weight factors is used for the selection of similar days. The effectiveness of the proposed approach is demonstrated on a typical load and weather data

Efficient Compression of 4D fMRI Images using Bandelet Transform and Fuzzy Thresholding (#145)
R. Rajeswari and R. Rajesh

Medical image compression techniques should give high compression ratios apart from preserving vital information in medical images. In this paper we propose a compression technique for four-dimensional functional Magnetic Resonance Images (fMRI). The proposed technique uses bandelet transform to capture the anisotropic regularity of edge structures apart from capturing regularity information from smooth regions. Then fuzzy thresholding is performed to retain the important bandelet coefficients. To further improve the compression we make use of variable length encoding technique viz., arithmetic coding. The proposed method is applied to 4D fMRI images and the results are compared with bandelet based ordinary thresholding. Test results show that the proposed method gives better results in terms of PSNR and compression ratio.

An Efficient Fuzzy Possibilistic code book design for Vector Quantization based Image Compression in the Wavelet Packet Domain (#205)

R. Nagendran and P. Arockia Jansi Rani

This paper presents an Efficient Fuzzy Possibilistic code book design for Vector Quantization in the Wavelet Packet Domain. Wavelet Packet Tree (WPT) methodology is applied to the whole image. The sub blocks of the input image are decomposed into two levels WPT where all coefficients of LL band and the approximation coefficients of LH, HL & HH bands are quantized using the proposed vector quantizer. The quantized coefficients are further compressed using Huffman encoder and then transmitted across. The image is reconstructed using the inverse WPT followed by index reassignment and the subsequent decoding process. The efficiency of the proposed work is analysed by varying the code vector (cluster) size from 8 to 512 in the order of 2n. It is found that the code vector of size 8 x 8 stands as a good choice by maintaining a compromise between quality and compression. The proposed work is also compared with other existing techniques. The results show that the psycho-visual fidelity criteria (both subjective and objective measures) of the proposed work are better than the other existing techniques.

A Data Mining Approach for Jet Grouting Uniaxial Compressive Strength Prediction (#235)

Joaquim Tinoco, António Gomes Correia and Cortez Paulo

Jet Grouting (JG) is a Geotechnical Engineering technique that is characterized by a great versatility, being the best solution for several soil treatment improvement problems. However, JG lacks design rules and quality control. As the result, the main JG works are planned from empirical rules that are often too conservative. The development of rational models to simulate the effect of the different parameters involved in the JG process is of primary importance in order to satisfy the binomial safety-economy that is required in any engineering project. In this work, tree data mining models, i.e. Artificial Neural Networks (ANN), Support Vector Machines (SVM) and Functional Networks (FN), were adapted to predict the Uniaxial Compressive Strength (UCS) of JG laboratory formulations. A comparative study was held, by using a dataset used that was obtained from several studies previously accomplished in University of Minho. We show that the novel data-driven models are able to learn with high accuracy the complex relationships between the UCS of JG laboratory formulations and its contributing factors.

Large Scale Information Retrieval using a Scatter Search based Approach (#207)

Habiba Drias, Dalal Daoudi and Samir Kechid

Information Retrieval or IR for short has been widely investigated these last decades and significant results have been applied to several domains like e-commerce, e-library and automatic medical diagnostics. However, very few studies in this area deal with artificial intelligence or AI tools. Knowing the power of meta-heuristics in problem solving, we suggest exploring information retrieval with an evolutionary approach. It appears that the methodology that seems structurally well suited to this problem is undoubtedly scatter search. The concept of similarity in IR between a query and a document according to the vector space model is correlated to the concept of the distance between solutions in Scatter Search. In this paper, we design and implement a scatter search algorithm for information retrieval called SS-IR. The algorithm is tested on the well known Smart collections and large data sets built for experimentation purposes. Numerical results are encouraging and show an interesting performance for the algorithm especially for large scale information retrieval.

Chair(s):S.M Shamsuddin and M Darus

Study of Cost Functions in Three Term Backpropagation for Classification Problems (#6)
Siti Mariyam Shamsuddin, Razana Alwee and Maslina Darus

Three Term Backpropagation(BP) Network as proposed by Zweiri in 2003 has outperformed standard Two Term Backpropagation. However, further studies on Three Term Backpropagation in 2007 indicated that this network only surpassed standard BP for small scale datasets but not for medium and large scale datasets. It has also been observed that by using Mean Square Error (MSE) as a cost function in Three Term BP has some drawbacks, and these include incorrect saturation and tend to trap in local minima, resulting in slow convergence and poor performance. In this study, thorough experiments on implementing various cost functions are executed to probe the effectiveness of Three Term BP network. The cost functions under investigations include Mean Square Error (MSE), Bernoulli function, Modified cost function and Improved cost function. The results reveal that MSE is not an ideal cost function to be used for Three Term BP. Hence, alternative cost functions need to be considered when using BP network for classification problems.

Differential subordination associated with generalized derivative operator (#10)
Maslina Darus

The authors have recently introduced a new generalised derivatives operator , which generalised many well-known operators studied earlier by many different authors. The trend of finding new operators such as the differential or the integral operators has attracted many researchers and in fact, has become necessary to some of the researchers. The results include the subordination and the inclusion.

Insolvency Prediction Model Using Artificial Neural Network for Malaysian General Insurers (#23)
Saiful Hafizah Jaaman, Shu Chiet Ng, Noriszura Ismail and Siti Mariyam Shamsuddin

Models of insolvency are important for managers who may not appreciate how serious is the condition of their companies' financial health until it is too late to take any effective action. Insolvency of insurance companies has been a concern to the community due to the need to protect the general public from the aftermath of insurer insolvency and to try to minimize the costs associated to this difficulty such as the insurance guaranty funds. The artificial neural network is utilized in this study to create an insolvency predictive model that could predict any future failure of general insurance company in Malaysia. Study uses thirteen financial ratios as indicator to classify the financial status of general insurance companies in Malaysia. Multiple regression analysis was used to determine the factor of insurance's insolvency. The results show that the factors which significantly affect general insurers' solvency are firm size, investment performance, combined ratio, and premium growth. Study then employs the neural networks to serve as an early warning system for predicting insolvency of insurance companies in Malaysia. The neural networks results show high predictability, suggesting the usefulness of this method for predicting future insurer insolvency in Malaysia.

Customers' Satisfaction of Express Bus Service : Important-Performance Analysis (IPA) and Customer Satisfaction Index (CSI) Approach (#26)
Zalina Mohd. Ali, Munira Ismail and Nur Riza Mohd. Suradi

This study is carried out to investigate customers' satisfaction level towards services provided by Express Bus Consortium Company. To achieve this aim, 200 respondents consisting of 65 men and 135 women were chosen. This study is carried out at three bus stations in Kuala Lumpur and Selangor area; those are Pudu Bus Station, Kajang Bus Station, and Putra Bus Station and were conducted through the questionnaire survey. The data collected will be analyzed using Important-Performance Analysis (IPA) and Customer Satisfaction Index (CSI). Important-Performance Analysis is used to test whether it contain factors that need to be given due consideration, to be maintained or have low priority

and also wastage factor. From the analysis, drivers and counter staff are categorized as factors which need to be given consideration. Comfort, security, and ticket price as factors which need to be maintained while service factor as factor which has low priority and lastly punctuality factor as wastage factor. Customer Satisfaction Index is used to analyze the percentage of customers' satisfaction level towards service provided. From the analysis done, CSI value obtained is 64.14%. This shows that customer' satisfaction level as whole is good.

The performance of M-based Generalized Linear Model (GLM) Procedures based on the coverage probability (#27)
Nora Muda

In designed experiments, we often encountered non-normal response variables. The data transformations (Transf) approach are frequently employed to deal with these problems. One has to realize that analyzing such data based on transformations posed many drawbacks. A better approach in dealing with these problems is by using the Generalized Linear Model (GLM). The problem becomes more complicated when there exists outlier in the data set. As an alternative, we may turn to robust (M-based) Generalized Linear Model (GLM) technique, which is less affected by outlier. In this paper we investigate the performance of the M-based GLM by doing the Monte Carlo simulation and its performance is compared to the Transf. and the GLM techniques. The empirical evidence shows that the M-based GLM is slightly better than the GLM and the Transf. approach in a well-behaved data. However, when contamination occurs in the data, its performance is remarkably robust with respect to outlier and non-normal responses.

Water Quality Study at Skudai River, 2002 – 2006 (#34)
Zalina Mohd Ali Mohd Ali and Faridatulazna Ahmad Shahabuddin Ahmad Shahabuddin

Healthy river systems can support a myriad of sustainable uses. They provide habitat for unique plants and animals, serve as a drinking water supply and offer recreational opportunities such as swimming, boating or fishing. The long term sustainability of such river resources is strongly tied to the quality of the water flow they rely on. Assessing the level of river water quality periodically is an important exercise in ensuring that the river water is safe for it many uses. This study investigates the level of water quality at Skudai River from year 2002 to 2006. Twenty parameters were identified and used in this analysis. These twenty parameters are recorded at all nine monitoring stations located throughout Skudai River. Multivariate statistical techniques i.e. factor and cluster analyses were used in this analysis. From this analysis we managed to group the rivers into three grouped less polluted, polluted and higly polluted rivers.

NaBIC SS17   Evolutionary Computing   Dec 11, 2009   09.00 - 10.45   Venue: F201

Chair(s): M. Wozniak and Z. Cui

A Classical-cum-Evolutionary Multi-Objective Optimization for Optimal Machining Parameters (#40)
Rituparna Datta and Kalyanmoy Deb

Optimal machining parameters are very important for every machining process. This paper presents an Evolutionary Multi-objective Genetic Algorithm based optimization technique to optimize the machining parameters (cutting speed, feed and depth of cut) in a turning process. The effect of these parameters on production time, production cost and surface roughness (which are conflicting to each other) are mathematically formulated. The non-dominated sorting genetic algorithm (NSGA-II) is used to get a Pareto-optimal front of the machining problem. The Pareto-optimal points are checked using epsilon-constraint single objective GA as well as using a classical optimization (SQP) method. An analysis of the obtained points is carried out to find the useful relation between the objective function and variable values.

A Two-step Method for Nonlinear Polynomial Model Identification Based on Evolutionary Optimization (#114)
Yu Cheng, Lan Wang and Jinglu Hu

A two-step identification method for nonlinear polynomial model using Evolutionary Algorithm (EA) is proposed in his paper, and the method has the ability to select a parsimonious structure from a very large pool of model terms. In a nonlinear polynomial model, the number of candidate monomial terms increases drastically as the order of polynomial model increases, and it is impossible to obtain the accurate model structure directly even with state-of-art algorithms. The proposed method firstly carries out a pre-screening process to select a reasonable number of important monomial terms based on the importance index. In the next step, EA is applied to determine a set of significant terms to be included in the polynomial model. In this way, the whole identification algorithm is implemented very efficiently. Numerical simulations are carried out to demonstrate the effectiveness of the proposed identification method.

Empirical Study on the Effect of Crossover in Genetic Software Architecture Synthesis (#187)
Outi Räihä, Kai Koskimies and Erkki Mäkinen

In our previous work, we have presented a method for genetically synthesizing software architecture design. Synthesis begins with a responsibility dependency graph and domain model for a system, and results in a full architecture proposal through the application of design patterns and architectural styles. In this paper, we study the method of reproduction in the genetic algorithm. More specifically, we try to find out whether sexual or asexual method of reproduction should be used. We hypothesize that although sexual reproduction method is so favored among various species of animals and plants, asexual reproduction is more natural in the case of genetic synthesis of software architecture. We search for empirical confirmation to our hypothesis by performing tests on two sample systems.

Stochastic Velocity Threshold Inspired by Evolutionary Programming (#199)
Zhihua Cui

Particle swarm optimization (PSO) is a new robust swarm intelligence technique, which has exhibited good performance on well-known numerical test problems. Though many improvements published aims to increase the computational efficiency, there are still many works need to do. Inspired by evolutionary programming theory, this paper proposes a self-adaptive particle swarm optimization in which the velocity threshold dynamically changes during the course of a simulation, and two further techniques are designed to avoid badly adjusted by the self-adaption. Six benchmark functions are used to testify the new algorithm, and the results show the new adaptive PSO clearly leads to better performance, although the performance improvements were found to be dependent on problems.

A Study of Topology in Insular Parallel Genetic Algorithms (#213)
Carlos Raimundo Erig Lima, Heitor Silvério Lopes and Leonardo Gomes Tavares

In this paper we study how the connectivity affects the performance of insular Parallel Genetic Algorithms (PGAs). Seven topologies PGAs were proposed, with growing number of connections. We used three instances of the well-known traveling salesman problem as benchmark. Each island of the PGA had different parameters and we established a fixed migration policy for all islands. Experiments were done and average results were reported. The effect of coevolution in PGAs was evidenced. The convergence time increased with the number of connections of the topology. The quality of solutions also increased in the same way. Although topologies with large connectivity increases the overall processing time, they take benefits to the quality of solutions found.

An Investigation of Topologies and Migration Schemes for Asynchronous Distributed Evolutionary Algorithms (#244)
Muhannad Hijaze and David Corne

Distributed evolutionary algorithms are of increasing interest and importance for three main reasons: (i) a well designed dEA can outperform a 'standard' EA in terms of reliability, solution quality, and speed; (ii) they can (of course) be implemented on parallel hardware, and hence combine efficient utilization of parallel resources with very fast and reliable optimization; (iii) parallel hardware resources are increasingly common. A dEA operates as separate evolving populations with occasional interaction between them via 'migration'. A specific dEA is characterized by the topology and nature of these interactions. Although the field is sizeable, there is still relatively little exploration of the performance of alternative topologies and interaction mechanisms. In this paper we compare some simple, novel dEA topologies with the cube-based topology that forms the basis of Alba et al's GDRCGA (a state of the art dEA). We find the best results (when topologies are compared on a like for like basis in terms of number of processors) emerge from a three-level tree-based topology.

A Java Library for Genetic Algorithms Addressing Memory and Time Issues (#255)
Luigi Troiano and Davide De Pasquale

In this paper we introduce a Java library for developing and testing genetic algorithm. The software architecture is aimed at addressing common issues regarding system memory and garbage collection in Java programming. In order to validate our solution, a comparison with other frameworks is provided.

Evolutionary Approach to Produce Classifier Ensemble Based on Weighted Voting (#28)
Michal Wozniak

Combining classifiers are nowadays one of the most promising direction in pattern recognition. There are many methods of decision making by the ensemble of classifiers. The most popular are methods that have their origin in voting, where the decision of the common classifier is a combination of individual classifiers' outputs, i.e. classifiers' responses (class numbers) or values of discriminants. This work presents classifiers' weights establish via evolutionary approach. We propose such method for classifier ensemble which could produce classifiers better than Oracle classifier what was shown in the previous works of author.

NaBIC SS18   Swarm Intelligence and PSO II   Dec 11, 2009   09.00 - 10.45
Chair(s): S. Sabat and G A V Pai   Venue: EB Seminar Hall

Failure Prediction of Banks Using Threshold Accepting Trained Kernel Principal Component Neural Network (#55)
Ravisankar Pediredla and V. Ravi

This paper presents a new neural network architecture kernel principal component neural network (KPCNN) trained by threshold accepting based training algorithm with different kernels like polynomial, sigmoid and Gaussian and its application to bankruptcy prediction in banks. KPCNN is a non linear version of the PCNN proposed elsewhere. In this architecture, dimensionality reduction is taken care of kernel principal component analysis. First the kernel matrices are computed and then PCNN is applied to those kernel matrices. The nonlinearity is introduced into the architecture by applying different kernels like polynomial, sigmoid and Gaussian etc. The efficiency of KPCNN is tested on different datasets including, Spanish banks, Turkish banks and UK banks datasets. Further t-statistic and f-statistic are used for feature selection purpose and the features so selected are fed as input to KPCNN for classification purpose It is observed that the features selected by t-statistic and f-statistic are identical in all datasets. Ten-fold cross validation is performed throughout the study. The performance of KPCNN on above datasets is compared with that of earlier results both with and without feature selection. From this study we can conclude that the KPCNN yields comparable results with all the techniques both with and without feature selection. Furthermore, we can conclude that this KPCNN best suits for the datasets with high nonlinearity.

Adaptive Accelerated Exploration Particle Swarm Optimizer for Global Multimodal Functions (#123)
Samrat Sabat, Layak Ali and Siba Udgata

This paper presents a novel variant of Particle Swarm Optimization (PSO) called Adaptive Accelerated Exploration Particle Swarm Optimizer (AAEPSO). AAEPSO algorithm identifies the particles which are far away from the goal and accelerate them towards goal with an exploration power. These strategies particularly avoid the premature convergence and improve the quality of solution. The performance comparisons of search efficiency, quality of solution and stability of the proposed algorithm are provided against (Differential Evolution) DE, Evolutionary Strategy (ES), Artificial Bee Colony Optimization (ABC) and Particle Swarm Optimization (PSO) algorithms. The comparison is carried out on the set of 10, 30 and 50 dimensional complex multi-modal benchmark functions. Simulation results indicate the superiority of the proposed AAEPSO over existing algorithms in terms of efficiency, quality solution and stability.

Swarm Intelligence Approach of Leaker Identification in secure Multicast (#130)
Sreelaja N.K and G.A.Vijayalakshmi Pai

Secure multicasting is used in a wide range of multicast applications such as commercial pay-per-view video multicast and pay-per view digital library. The multicast protocol used must be secure with copyright protection to prevent the users from leaking the information. This paper focuses on the problem of leaker identification using a swarm intelligence (Ant Colony Optimization) based approach. Termed Ant Colony Optimized Leaker Identification algorithm (ACOLIA), the novel technique serves to efficiently identify the leaker while overcoming the drawbacks of the existing sequential search method, for leaker identification. Simulation results are shown to prove that the number of comparisons made by the ACOLIA is less when compared to the sequential search method for leaker identification.

A PSO Based method for Detection of Brain Tumors from MRI (#236)
Satish Chandra, Rajesh Bhat and Harinder Singh

Detection of brain tumors from MRI is a time consuming and error-prone task. This is due to the diversity in shape, size and appearance of the tumors. In this paper, we propose a clustering algorithm based on Particle Swarm Optimization (PSO). The algorithm finds the centroids of number of clusters, where each cluster groups together brain tumor patterns, obtained from MR Images. The results obtained for three performance measures are compared with those of Support Vector Machine (SVM) and Ada Boost. The performance analysis shows that qualitative results obtained from the proposed model are comparable with those obtained by SVM. However, to obtain better results from the proposed algorithm we need to carefully select the different values of PSO control parameters.

Optimal Placement of Phasor Measurement Units using Particle Swarm Optimization (#150)
Abhinav Sadu, Rajesh Kumar and Rajesh Kavasseri

This paper solves the Phasor Measurement Unit (PMU) Placement problem by Particle swarm Optimization (PSO). The PSO algorithm is implemented on three bus systems namely the 7, 14, 57 IEEE standard Bus systems. In this paper it has been proved that the placing of Phasor measurement units only at buses with the highest number of incident branches surely doesn't yield the optimal placement of the PMUs .This encouraged the idea of random placement of PMUs in the system and selection of the specific arrangement of PMUs which accomplished the task of complete observability of the system with minimum number of PMUs thus optimizing the PMU placement problem.

Strategies of Division of Labour for Improving Task Efficiency in Multi-Robot Systems (#171)
Sifat Momen and Amanda Sharkey

This paper addresses the issue of allocating tasks in multi-robot systems and evaluates the strategies that various ant colonies display in carrying out tasks and proposes four different task allocation strategies within the realms of multi-robot systems. The paper also introduces the concept of cost-benefit ratio as a measure of performance index for the task allocation strategies identified. Experimental results show that uniformly distributed specialised workers are better than generalised workers in carrying out tasks. The paper then improves the performance of the strategies by incorporating a long term memory to carry out tasks. The proposed model for task allocation is highly efficient, accurate and consistent with the biological counterparts. The model offers benefits in designing efficient multi-robot systems that can carry out more than one task.

Distributed Area Coverage Using Robot Flocks (#204)
Ke Cheng, Prithviraj Dasgupta and Yi Wang

We consider the problem of distributed,autonomous area coverage using a team of mobile mini-robots that have limited sensing and computation capabilities. Specifically, we investigate the following hypothesis - can mini-robots organized in small teams improve the efficiency of area coverage as compared to area coverage using robots that are not organized as teams? We envisage that team formation for mini-robots can be realized through simple, nature-inspired formation control algorithms such as flocking. We provide coordination mechanisms between robots that allow the robots forming a team to dynamically correct their relative position and move in formation, as well as, to dynamically adapt their position and orientation on encountering an obstacle. We have extensively tested our formation control mechanism and area coverage algorithm using accurate models of e-puck robots within the Webots robot simulator, as well as on physical e-puck robots. Our results indicate that our team-based area coverage technique achieves comparable coverage with lower overhead with respect to other distributed area coverage mechanisms for mini-robots.

Fusion of Evolutionary Algorithms and Multi-Neuron Heuristic Search for Robotic Path Planning (#206)
Rahul Kala, Anupam Shukla and Ritu Tiwari

The problem of path planning deserves a special mention in the field of robotics as it enables the intelligent systems used in autonomous robots to move the robot from one position to the other. Out of the various methods used for solving the problem of robot path planning, two of the common approaches include Multi-Neuron Heuristic Search (MNHS) algorithm and Evolutionary Algorithms (EA). The MNHS algorithm is an algorithm proposed earlier by the authors for solving uncertain search problems. The algorithm is slow but optimal. On the other hand the EA gives results in finite time, but the optimality cannot be guaranteed. In this paper we propose to mix these two techniques to get the added benefits of both these algorithms. The MNHS makes the algorithm optimal while the EA does the task of time optimization especially in case of complex graphs. The EA carries forward the task of selection of points in the robotic map. These points are checked for feasibility and then converted into a traversable graph. The same is used by MNHS to find the most optimal path from source to destination. In this way the algorithm finds out the best path without robotic collision.

Construction and Improvement Heuristics applied to the Capacitated Vehicle (#215)
Leonardo Gomes Tavares, Heitor Silvério Lopes and Carlos Raimundo Erig Lima

The capacitated vehicle routing is a combinatorial optimization problem of that has aroused major interest because it is present in critical areas (logistics, transport and other) and it is a problem of considerable difficulty. There are currently several techniques that have been developed to try to solve this problem efficiently. In this paper, we present a solution to this problem based on the strategy of

different single techniques combination to obtain the best results. Computing experiments have been conducted on six instances of well-known data sets available in literature.

Design and implementation of fractional order pid controller for aerofin control system (#225)
Ravi kumar jatoth, venu kishore kadiyala and pothalaiah sake

This paper proposes the tuning of Fractional Order PID (FOPID) controller of electromagnetic actuator (EMA) system for aero fin control (AFC) using Particle swarm optimization (PSO). The EMA is realized with permanent magnet brush DC motor which is driven by a constant current driver. Using the non-linear model of EMA-AFC system that includes the non-linearities of DC motor, an FOPID position controller is designed using different soft computing techniques like PSO in SIMULINK so that the system satisfies all the design requirements. We proposed PSO based FOPID controller which is tuned by using PSO algorithms respectively. The design parameters which are to be optimized are rise time, peak time and percentage overshoot. Presented results show that the transient response and closed loop response of EMA-AFC system using PSO based tuning of FOPID is better when compared to that of conventional methods and untuned system.

A novel methodology for indoor positioning (#238)
Md. Ahsan Habib and Tasbirun Nahian Upal

This paper presents a novel methodology that can be used to design location aware systems. Here, a sound signal is trapped between two distantly separated transceivers in an endless loop. As the transmitting medium between the two modules is air, there is a phase difference at the transmitting and the receiving end which is proportional to their separating distance. The signal, thereby circulates is a sinusoidal wave formed by summation of multiple phasors. This signal endowed with an interesting characteristics; its maximum amplitude shoot's up at separating distance equivalent to an integer multiple of single wavelength of the sound wave applied. A positioning system is designed and practically implemented applying this method, which can locate a target within few millimeters of its true position. We have also introduced an intelligent control unit to enhance its performance.

NaBIC SS20   ACO/ Immune Systems   Dec 11, 2009   09.00 - 10.45   Venue: F203
Chair(s): D.Dasgupta and G Panda

Performance Analysis for the enhancement of ACO Algorithm Using Fourier Transform (#151)
Raghavendra GS, Prasanna Kumar N and Amit Dharmaraj Borase

Ant Colony Optimization (ACO) algorithms belong to class of Meta-heuristic algorithms, where a search is made for optimized solution rather than exact solution, based on the knowledge of the problem domain. ACO algorithms are iterative in nature. As the iteration proceeds, solution converges to the optimized solution. In this paper, we examine the pheromone trial, a knowledge repository for ants, which guides the ants in the search process and analyzed the nature of convergence of ACO algorithms using Fourier transforms.

ACO Approaches for Large Scale Information Retrieval (#227)
Habiba Drias, Moufida Rahmani and Manel Khodja

This paper presents two ACO algorithms for information retrieval. Unlike existing works, the proposed algorithms address the problem for large scale data sets. The algorithms and a classical information retrieval method have been implemented for comparison purposes. Experimentations have been conducted on Smart collections and random benchmarks. Numerical results show that for small collections of documents the classical approach is faster than ACO algorithms whereas for large scale data, ACO is much more interesting in terms of runtime and performs as well as the exhaustive search. The novel outcome of this study consists in determining the frontier in terms of collection size from which ACO outperforms the classical information retrieval algorithm especially from the runtime point of view.

Change detection in dynamic fitness landscapes: An immunological approach (#27)
Hendrik Richter

Detecting the point in time where a dynamic fitness landscape changes is vital for a considerable number of diversity management schemes that used in evolutionary algorithms employed for solving dynamic optimization problems. Here, we introduce a change detector based on principles of artificial immune systems, namely a negative selection algorithm. We show in numerical experiments that such an immunological approach allows to solve the change detection problem successfully for dynamic fitness landscapes.

Development of a Nonlinear Model of Unijunction Transistor using Artificial Immune System (#63)
Satyasai Jagannath Nanda, Sasmita Kumari Behera and Ganapati Panda

The efficient modeling of unijunction transistor (UJT) is an burning issue in power industries. The available SPICE based model provides VI characteristic of UJT. The output characteristic of UJT is nonlinear in nature and its modeling plays a important role in many applications where the output voltage of UJT drives any other device or circuit. In this paper a nonlinear device model is proposed using functional link artificial neural network (FLANN) and adaptive finite impulse response (FIR) filter along with artificial immune system (AIS) for simulation of UJT. The potential of the proposed model is demonstrated for modeling of both the VI and output characteristics of UJT under variable load conditions.

Improved Protein Structural Class Prediction Using Genetic Algorithm and Artificial Immune System (#64)
Sitanshu Sekhar Sahu, Ganapati Panda and Satyasai jagannath Nanda

Predicting the structure of a protein from primary sequence is one of the challenging problems in Molecular biology. In this context, protein structural class information provides a key idea of their structure and also other features related to the biological function. In this paper we present a new optimization approach using the Genetic algorithm (GA)and artificial immune system (AIS) for predicting the protein structural class. It uses the maximum component coefficient principle in association with the amino acid composition feature vector to efficiently classify the protein structures. The effectiveness is evaluated by comparing the results with that obtained from other existing methods using a standard database. Especially for all α and $\alpha+\beta$ class protein, the rate of accurate prediction by the proposed methods is much higher than their counterparts.

NaBIC SS21   Clustering   Dec 11, 2009   11.00 - 12.45   Venue: F201
Chair(s): T.Chaira and B.Chen

A novel intuitionistic fuzzy c means color clustering of human cell images (#17)
Tamalika Chaira

This paper addresses a novel issue of intuitionistic fuzzy c means clustering using intuitionistic fuzzy set theory. The intuitionistic fuzzy set theory takes into the membership degree and non membership degree. Non membership degree is calculated from Sugeno type intuitionistic fuzzy complement. The introduction of another uncertainty term i.e. the non membership degree helps to converge the cluster center to a desirable location than the cluster centers obtained by fuzzy C means algorithm. The color space used is the CIELab color model which is a human perceptual model and the experimental results on different types of pathological color cell images show the effectiveness of the proposed method in contrast to existing fuzzy C means algorithm.

An Incremental Clustering of Gene Expression data (#80)
Rosy Das, Dhruba Bhattacharyya and Jugal Kalita

This paper presents a density based clustering method (DGC) for clustering gene expression. An incremental clustering based on DGC is also presented here. The clustering methods were experimented in light of real-life datasets and the methods have been established to perform satisfactorily. The methods were also compared with some well-known clustering algorithms and found to perform well in terms of z-score cluster validity measure.

A Novel Clustering Based Niching EDA for Protein Folding (#110)
Benhui Chen and Jinglu Hu

Protein structure prediction (PSP) is one of the most important problems in computational biology. And it also is a very difficult optimization task, especially for long sequence instances. This paper proposes a novel clustering based niching EDA for HP model folding problem. The EDA individuals are clustered by the affinity propagation clustering method before submitting them to niching clearing. A cluster can be seen as a niche in clearing procedure. The niche clearing radius can be adaptively determine by clustering. And an approach based on Boltzmann scheme is proposed to determine the niche capacity according to the adaptive clearing radius and niche fitness. Experimental results demonstrate that the proposed method outperforms the basic EDAs method. At the same time, it is very competitive with other existing algorithms for the PSP problem on lattice HP models.

Development of FCM based algorithm for the delineation of QRS-complexes in Electrocardiogram (#113)
Nitin Lingayat, Sarabjeet Singh Mehta and Swati Sharma

This paper proposes a simple technique for automatic detection and delineation of cardiac beat (QRS-complex) in Electrocardiogram (ECG) using Fuzzy C-Means (FCM) clustering algorithm. The power line interference and baseline wander present in the ECG signal is removed using digital filtering techniques. Absolute slope of the filtered ECG signal is calculated to enhance the QRS-complexes in the ECG signal. FCM technique is then used to delineate QRS and non-QRS-regions. Algorithm performance is validated using original single lead ECG recordings from the dataset-3 of the CSE multi-lead measurement library. Detection rate of 98.74% is achieved. The percentage of false positive and false negative detection is very low. The delineation performance of the algorithm is validated by calculating the mean and standard deviation of the errors between automatic and manual annotations by the referee's cardiologists/combined program median in the CSE study.

An Evolutionary Gene Expression Microarray Clustering Algorithm Based on Optimized Experimental Conditions (#152)
Mrinal Sen, Sheli Sinha Chaudhury, Amit Konar and R Janarthanan

Entities of the real world require partition into groups based on even feature of each entity. Clusters are analyzed to make the groups homologous and well separated. Many algorithms have been developed to tackle clustering problems and are very much needed in our application area of gene expression profile analysis in bioinformatics. It is often difficult to group the data in the real world clearly since there is no clear boundary of clustering. Gene clustering possesses the same problem as they contain multiple functions and can belong to multiple clusters. Hence one sample is assigned to multiple clusters. A variety of clustering techniques have been applied to microarray data in bio-informatics research. We have proposed in this paper an easy to implement evolutionary clustering algorithm based on optimized number of experimental conditions for each individual cluster for which the elements of that group produced similar expression and then compared its performance with some of the previously proposed clustering algorithm for some real life data that proves its superiority compared to the others. The proposed algorithm will produce some overlapping clusters which re-imposes the fact that a gene can participate in multiple biological processes.

A Particle Swarm Approach for Uniform Cluster Distribution in Data Centric Wireless Sensor Networks (#272)
Bhaskar Deosarkar, Narendra Singh Yadav and Rajendra Prasad Yadav

This paper presents a scheme, in which the collaborative efforts of limited number of sensor nodes provide the social guidance for localization process to be used for uniform distribution of the clusters, over the network area. Utilizing the information provided as social guidance, in the form of gbest value and the direction for position update, the sensor nodes localize them iteratively adjusting their position, in the swarm, relying on the measurements obtained from RSSI. Utilizing this location information, sensor nodes assign them to different clusters. Results of the simulations carried out in NS-2, show that the proposed algorithm is capable of localizing the sensor nodes and has a great potential of uniform cluster distribution, provided RSS indicators provide necessary support for distance estimation.

NaBIC SS22   **Intelligent Systems**   **Dec 11, 2009 11.00 – 12.45**   **Venue: F202**

Chair(s): E.Tzafestas and R.Guha

A Randomized Iterative Improvement Algorithm for Photomosaic Generation (#135)
Harikrishna Narasimhan and Sanjeev Satheesh

A photomosaic is an image assembled from smaller images called tiles. When a photomosaic is viewed from a distance, it resembles a desired target image. The process of photomosaic generation can be viewed as an optimization problem, where a set of tiles needs to be arranged to resemble a target image. We impose a constraint on the number of times a tile image can be repeated in a photomosaic. A randomized iterative improvement algorithm is used to generate photomosaics and the intermediate results are used to produce interesting animations. We show that the proposed technique is more efficient than genetic algorithm.

Modeling Emotions for Choosing Between Deliberation and Action (#228)
Darsana Josyula, Franklin Hughes, Harish Vadali and Bette Donahue

Agents that operate in the real world have to make a decision on how long they can deliberate before they need toact. This paper describes how a model of emotions can help a metacognitive component of an artificial agent to make this decision. The emotional model is illustrated within the domain of an air traffic control simulation system.

Cost Optimal Design of 3-D Steel Building Frames Using CA-LFSR (#250)
Debasish Moitra, Prosenjit Das, Pushan Mitra and Biplab K Sikdar

Tall steel building frames are subjected to substantially high lateral forces due to wind and/or earthquake, in addition to the usual dead and live loads. The cost of construction of such frames can be reduced by providing additional structural steel members, known as bracings, between suitable pairs of nodes of the building. The bracings reduce the force quantities in the steel beams and columns, thus reducing the section requirements of these members. In the conventional design procedure based on the principles of structural engineering, it is nearly impossible to find out the optimum bracing system for a given building, as a large number of design alternatives exist regarding the choice of bracing pattern and the placing of braces. The present work aims at developing an alternative design scheme that may provide an easier way to arrive at a near-optimum solution in zero time. Bracing systems for 3-D building frames are generated with the help of coupled CA-LFSR, defined in Galois extension field. A CA-LFSR state corresponds to the bracing system for a storey of the building. Exhaustive design experiments have been carried out with 3-D building frames with varying numbers and bays and stories. The results show that the proposed CA-LFSR based approach is most effective for the design of tall building frames, and can reuse a design for scalability.

Spaces of Imitation (#252)
Elpida Tzafestas

This paper presents an imitation mechanism and a study of its behavior in spatial grid-based configurations. The imitation mechanism replicates external signals without associating with objects, as in higher-level imitation; it is therefore a model of proto-imitation where agents imitate unconditionally the agents they happen to interact with. We study the mechanism in 2D space to understand how it influences the emerging spatial structures. Our results indicate that in the absence of "adults", i.e agents that act as tutors and do not imitate others, the whole grid eventually stabilizes to one common language for all agents. This is more rapid when various agent mobility schemes are introduced. Complex local micro-languages may emerge permanently, for example if a fair number of adults is present or temporarily if new words have to be invented from time to time, for example to account for new environmental stimuli or cultural factors. All our results suggest that a purely reactive proto-imitation mechanism can suffice to produce various language configurations in space, without the need for agents to reason explicitly on conditions and possible outcomes of language adoption.

The Changing Trend of User Applications and Operating System Design Objectives for Parallel Computing by Reconfigurable FPGAs (#270)
Radha Guha

High performance computing (HPC) by parallel computing effort faces several challenges. The first challenge is the efficient design and management of the parallel computing resources of the hardware platform. The second challenge is transforming the sequential program meant for classic Von Neumann architecture to explicit parallel instruction computing (EPIC) architecture. The third challenge is the design of an efficient operating system (OS) for task mapping and scheduling for higher resource utilization and load balancing. Though need for HPC and the development of parallel hardware platforms are evolving over the last three decades, the application developers are still not familiar with the parallel programming styles and exploration of the parallel resources of the hardware platform. This paper is a comprehensive analysis of the required hardware platform, required functionalities of an efficient OS and required mechanisms for changing the sequential program to parallel program for the HPC platform developed of multiple microprocessors and multiple hardware accelerators of FPGAs. This analysis is based on the currently available technologies which can enable HPC on the parallel computing platform.

Towards The Adaptive Questionnaire Generation Using Soft Computing (#58**)**
Sumit singh and Ayushi Garg

 A central problem in marketing is the clear understanding of consumer's choice or preferences. This is achieved by designing questionnaires and then analyzing the answers of would be customers. The traditional approach in the conjoint analysis has been the designing of non-adaptive questionnaires. The questionnaire is predetermined and not at all influenced by respondent's answers. This paper aims to design the questionnaire that is influenced by respondent's answer by implementing soft computing and approximate reasoning methodologies. The further extensions of the soft computing methods for product recommender system have been also discussed to design adaptive questionnaire.

NaBIC SS23   **Nature inspired Soft Computing Applications**
                                                      Dec 11, 2009 11.00 – 12.45   Venue: F203
Chair(s): S. Kohle and A.Jain

Palmprint Authentication Using Fusion of Wavelet Based Representations (#100)
Prasad S.M., Govindan V.K and Sathidevi P. S.

Wavelets are widely used to extract the texture features for pattern recognition applications including biometric authentication. This can be attributed to the discriminating capability of wavelet features and the availability of fast algorithms for implementing discrete wavelet transform (DWT). In most of the wavelet based palmprint applications, distribution of energies in spatial-frequency domain are treated

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as features to classify the palmprints. Although wavelet energies are good discriminating features, they fail to characterize the palmprints sufficiently. In order to enhance the discriminating capability and the palmprint recognition accuracy; we extract the intramodal palmprint line and energy features from the same wavelet decomposition of palmprint. The score level (product rule and sum rule) fusion of these features improves the recognition accuracy significantly. We empirically found 39.38% relative improvement (RI) with an overall equal error rate (EER) of 1.37%, on PolyU online palmprint database (left hand palmprints). The computational burden on feature extraction is very less, and the EER is superior to other state of the art approaches. The comparison of the results with the state of the art wavelet and fusion based palmprint recognition approaches demonstrates the effectiveness of the proposed approach in classifying palmprints.

Building Consensus of Human Papillomavirus using Genetic Algorithm (#22)
Aditya Bir, Jyotsna Dongerdive, Suruchi Jamkhedkar and Siby Abraham

The paper introduces a novel three tier architecture to find consensus of Human Papillomavirus(HPV). The proposed procedure is based on simulation and uses all complete genomic DNA sequences of registered HPV strains available in NCBI GenBank. It uses the multiple sequence alignment tool Clustal X to align these sequences. Genetic Algorithm is used to evolve an optimized population of complete genomic DNA sequences. The GA, which uses domain specific genetic operators like migration, rank selection, mutation and crossover, adopts a novel approach in defining the fitness function. A modified approach of the Weight Matrix Algorithm is applied on the optimized and evolved population to find a consensus of HPV. The effectiveness of the procedure is validated with experimental results.

Unit Commitment with Nature and Biologically Inspired Computing (#35)
Lingamurthy Belede, Amit Jain and Ravikanth Reddy Gaddam

Several strategies have been proposed to provide quality solutions to the Unit Commitment Problem and increase the potential saving in the power system operation. These include deterministic and stochastic search algorithms. One of the limitations of deterministic approaches is, they suffer from the curse of dimensionality when dealing with the   modern power system with large number of generators. Recently evolutionary based search techniques are popularly applied to Unit Commitment Problem which may handle complex non-linear constraints and provide high quality solution. In this paper an attempt has been made to give a detailed survey of the application of the nature and biologically inspired computing techniques in the field of unit commitment problem since past 20 years. This literature survey will be very useful to the new researchers working on this area of research.

Simulation of Bionic Electrolocation Sensor based on Weakly Electric Fish (#31)
Gerhard von der Emde, Kavita Mayekar, Herbert Bousack and Michael Pabst

Weakly electric fish employ active electrolocation for orientation and navigation in their environment at night and are thus able to perceive an electrical image of their surroundings even in complete darkness. This principle of active electrolocation is adopted to design a technical sensor system, which will able to detect and to analyze the walls of blood vessels and obstacles within them. The main objective involves the construction and testing of the artificial sensor, including the electronic circuits for signal analysis. To establish effective and optimal parameters for the sensor FEM analysis is done. Simulation results demonstrate the feasibility of proposed design of catheter based electrolocation sensor. Further by implementing efficient design of amplifier and signal processing circuit it is possible to develop biologically inspired technical sensor for routine blood vessel diagnostics and be adopted for finding and analyzing pathologic changes of artery walls.

Developing through a Modeling of the Database and preparing for Data Mining: Implementation for EHR to Cardiovascular Monitoring (#15)
Hugo Bulegon, Silvio Bortoleto, Angelmar Constantino Roman,Cludia Maria Cabral Moro, Fransisco Javier Navarro Kantek Katia Bortoleto

The modeling data is very important to building systems, because it gives an idea of the complete operation and helps in the process of data mining. From this information, a system was developed to facilitate the clinical management in primary health care, improving efficiency in reducing the morbidity

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and mortality. The software is a implementation for EHR (Electronic Health Records) focused in the management of major cardiovascular risk factors – CRF (diabetes, hypertension, dyslipidemia, smoking and others), which are monitored after a registration information of the patient.Provides summary clinical information for management and through the processing of the results of subsequent laboratory tests, monitor the targets for therapies, according to the level of achievement of results, indicates maintenance or intensification of care. Entity-Relationship Diagrams were used to the development of software.

Utilization of the Apriori Data Mining method in a research software with electronic protocol in Enteral Nutrition (#13)

Carlos Henrique Kuretzki, Maria Eliana M. Schieferdecker, Jose Simao de Paula Pinto, Osvaldo Malafaia, Antonio Carlos Ligocki Campos and Silvio Bortoleto

The aims this paper is to display the Apriori Data Mining Method results implanted in SINPE in an Enteral Nutrition research. Due to the necessity of the program for being more dynamic, allowing the data intersection, helping on decisions and on the elaboration of diagnostics as well as on diets prescriptions, checking the possible relationships between the analyzed items. The rules of creation are based in the association of those items.

An information system for drug interactions: pharmaceutical care and prescription (#16)

Luciano Roberto Hirano, Cláudia Seiko Yokoyama, Silvio Bortoleto, Claudia Marai Cabral Moro, Hugo Bulegon and Percy Nohama

Many advances in medicine, but the occurrence of errors that accompany the completion of forms are inevitable for the human condition. An information system is to achieve the prescription indicating possible drug interactions, reducing a large number of incidents related to medical errors. The implementation of the system also reduces the time of hospital beds and administrative costs, allowing an improvement in quality of care to the patient. The rational use of medicines should be a more effective prescription and pharmaceutical care is responsible for such care.

CISIM SS1   Computational Intelligence   Dec 09, 2009   15.00-17.00   Venue: Y202

Chair(s): M. Pant and R Ravi

Evolutionary Algorithms Based Speed Optimization of Servo Motor in Optical Disc Systems (#22)

Radha Thangaraj, Millie Pant and Ajith Abraham

Evolutionary Algorithms are inspired by biological and sociological motivations and can take care of optimality on rough, discontinuous and multimodal surfaces. During the last few decades, these algorithms have been successfully applied for solving numerical bench mark problems and real life problems. This paper presents the application of two popular Evolutionary Algorithms (EA); namely Particle Swarm Optimization (PSO) and Differential Evolution (DE) for optimizing the average bit rate of an optical disc servo system. Two optimization models are considered in the present study subject to the various constraints due to servo motor. The results obtained by PSO and DE are compared with the experimental and the design results given in the literature. Simulation results clearly show the superior performance of PSO and DE algorithms.

MALBACO - A New Multi-Agent Load Balanced Ant Colony Optimization Algorithm for MANETs (#47)

Ditipriya Sinha and Rituparna Chaki

Mobile ad hoc networks do not have any fixed topology. Routing in such network is very challenging and difficult due to the mobility of the nodes. MANET is the mobile ad hoc network which consists of number of mobile routers connected by wireless link. Ant colony optimization is an efficient optimization technique used to find the optimum shortest route in the adhoc network. This paper describes a new

routing algorithm for MANETs using Ant Colony Optimization technique. Special attention has been given to the load balancing and congestion control in network. Simulation work is presently being undertaken to evaluate the performance of the model.

An Empirical Comparison of Differential Evolution Variants on Different Classes of Unconstrained Global Optimization Problems (#56)
G. Jeyakumar and C. Shunmuga Velayutham

This paper presents an empirical analysis of the performance of Differential Evolution (DE) variants on different classes of unconstrained global optimization benchmark problems. This analysis has been undertaken to identify competitive DE variants which perform reasonably well on a range of problems with different features. Towards this, fourteen DE variants were implemented and tested on 14 high dimensional benchmark functions grouped by their modality and decomposability viz., unimodal separable, unimodal nonseparable, multimodal separable and multimodal nonseparable. This extensive performance analysis provides some insight about the competitiveness of DE variants in solving test problems with representative landscape features such as modality and decomposability.

SOM Neural Network - a Piece of Intelligence in Disaster Management (#57)
Petr Klement

A collaborative Emergency call taking information system in the Czech Republic processes calls on the European 112 emergency number. Amounts of various incident records are stored in its databases. The data can be used for mining spatial and temporal anomalies. When such an anomalous situation is detected so that the system could suffer from local or temporal performance decrease, either a human, or an automatic management module could take measures to reconfigure the system traffic and load. In this paper we describe a method of knowledge discovery and visualization with respect to the emergency call taking information system database characteristics. The method is based on Kohonen Self Organizing Map (SOM) algorithm. Transformations of categorical attributes into numeric values are proposed to prepare training set appropriate for successful SOM generation.

A Study on Genetic Algorithm based Video Abstraction System (#58)
D. K. Ashwin Raju and C. Shunmuga Velayutham

This paper proposes to investigate on the efficacy of Genetic Algorithm (GA) based video abstraction system to deliver a meaningful summary (still image abstract) with minimal preprocessing on the given video. The GA employs novel crossover and mutation operators to search for a meaningful summary in a search space of all video summaries. This preliminary investigation employs Euclidean and City-block distance measures, based on simple color histogram, color histogram by Gong [18] and color correlogram, among the frames as fitness functions and assumes that the number of frames in the still image abstract is known apriori. The performance of GA based video abstraction system has been tested on 6 documentary videos from the open video project. The simulation results, though not very promising, strongly hints the potential of GA for automatic video abstraction and motivates further exploration.

Rough Neuro-PSO Web Caching and XML Prefetching for Accessing Facebook from Mobile Environment (#104)
Sarina Sulaiman, Siti Mariyam Shamsuddin and Ajith Abraham

Prefetching and Web caching have been known as techniques to increase the speed of Web loading process. Previous studies have been conducted to infuse artificial intelligence such as Artificial Neural Network (ANN) into Web caching. In this paper, we propose a new hybrid technique based on combination of ANN and Particle Swarm Optimization (PSO) for classification Web object either to cache or not and generate rules from log data by using Rough Set technique on proxy server (Rough Neuro-PSO). It is needed because mobile context has limited resources like speed and memory. Our method is by using XML file for prefetching which is saved into mobile memory. Prefetching that used xml file is much faster to be searched or accessed. In Web caching side, we enhance the speed by using Rough Neuro-PSO in order to choose the log. At the end of this paper, we present a new framework that is believed to speed up the access of Web page in mobile environment context.

CISIM SS2   Computational Models   Dec 09, 2009   17.45-19.30   Venue: Y202
Chair(s): N. Chaki and R Nadarajan

Effect of beta in Random Walks Approach for LV Contour Extraction (#5)
Sarada Dakua and Jyotinder Sahambi

In today's world, increasing life expectation have made the heart failures of important concern. For clinical diagnosis, parameters for the condition of heart are needed. Accurate and fast image segmentation algorithms are of paramount importance prior to the calculation of these parameters. An automatic method for segmenting the cardiac magnetic resonance (CMR) images is always desired to increase the accuracy. We prefer random walk method due to its noise robustness and unconditional approach over other segmentation algorithms. Performance of the method solely depends on the selection of the free parameter ¯, which uses to be decided manually. The accuracy of the output significantly depends on this parameter. In this work, we present a method to decide its value automatically enhancing the accuracy of the performance.

Modeling and Predicting Stock Returns using the ARFIMA-FIGARCH - A case study on Indian Stock data (#43)
Palaniappan Bagavathi Sivakumar and V P Mohandas

Modeling of real world financial time series such as stock returns are very difficult, because of their inherent characteristics. ARIMA and GARCH models are frequently used in such cases. It is proven of late that, the traditional models may not produce the best results. Lot of recent literature says the successes of hybrid models. The modeling and forecasting ability of ARFIMA-FIGARCH model is investigated in this study. It is believed that data such as stock returns exhibit a pattern of long memory and both short term and long term influences are observed. Empirical investigation has been made on closing stock prices of S&P CNX NIFTY. The obtained statistical result shows the modeling power of ARFIMA-FIGARCH. It is proven that, by combining several components or models, one can account for long range dependence found in financial market volatility. The results obtained illustrate the need for hybrid modeling.

Towards Modeling Stored Value Electronic Money Systems (#51)
Shunsuke Inenaga, Kenichirou Oyama and Hiroto Yasuura

This paper presents mathematical and general models of electronic money systems. The goal of the paper is to propose a first framework in which various kinds of e-money systems can be uniformly represented and their security properties can be evaluated and compared. We introduce two kinds of e-money system models; a note-type e-money system model and a balance-type e-money system model. We show that any balance-type e-money system with efficient data transmission cannot be simulated by any note-type e-money system. This implies that balance-type e-money systems are strictly faster in data communication. Then, we show that a forged monetary value can be detected in some note-type e-money systems, while it cannot be detected in any balance-type e-money systems with efficient data communication. This implies that note-type e-money systems are more secure.

Obtaining a Continuous Time Markov Decision Process from Statecharts (#60)
Marcelino Silva, Ádamo Santana, Carlos Francês, Nandamudi Vijaykumar and Solon Carvalho

This paper proposes a strategy to associate Statecharts with a Markov Decision Process for performance evaluation. Statecharts are adapted to represent the possible decision choices and the costs incurred from decisions. Markov Decision Process is used to evaluate the long term effects of decisions. This strategy can aid users without a good knowledge of the performance evaluation process, and may participate in a more effective way in the modeling phase, providing information to make a more realistic model.

Active Contours without Edges and without Reinitialisation (#63)
Eduard Sojka, Jan Gaura, Tomáš Fabián and Michal Krumnikl

This paper is concerned with the application of a level set method in the image segmentation. As a starting point we are using well know Chan and Vese's method. It is known that for the correct function of this method, the reinitialisation is sometimes needed to be carried out. The reinitialisation step is a process that is problematic is problematic both from the theoretical and the practical point of view. In this paper, we introduce a method that does not require reinitialisation (during the iteration process, it is not necessary to switch between the usual and reinitialisation steps). The method is based on formulating the image segmentation as a problem of minimising a functional with a constraint. The solution is done by making use of the Lagrange multipliers method. We present all necessary equations required for the computation. The presented method has been implemented and it was verified that it operates according the theoretical presumption.

Modeling & Analysis of Transaction Management for Distributed Database Environment using Petri Nets (#69)
Bidyut Biman Sarkar and Nabendu Chak

Enterprises are physically distributed over different locations like continents, countries, plants, divisions, laboratories, departments, work-groups and so on. However, logically an enterprise can function as one unit of work. To support such logical unity among the dispersed objects, a generic framework of distributed computing is necessary. As there is no global clock available to synchronize the transactions in a loosely coupled true distributed environment, one needs to device some cost effective yet easily deployable generic model for asynchronous distributed transmissions. Transaction management system for the distributed environment must ensure that the sequence of updates on the stable storages in different locations are reliably committed or aborted as a single complete unit of work. In this paper we propose to revisit the conventional Two Phase Commit (2PC) protocol of transactional technology for ensuring the consistent commitment of distributed transactions. The proposed net model may be used to model and analyze transactions in distributed environment.

CISIM SS3   Intelligent Systems   Dec 10, 2009   14.00-16.00   Venue: Y202
Chair(s): S. Sugiyama and V. Snasel

Hybrid Multispectral Image Fusion Method (#53)
Tanish Zaveri, Mukesh Zaveri and Ishit Makwana

Standard Pan sharpening methods do not allow control of the spatial and spectral quality of the fused image. The color distortion is also most significant problem in standard Pan sharpening methods. In this paper a novel hybrid Pan sharpening method using contourlet transform is proposed which provides novel tradeoff solution between the spectral and spatial fidelity and preserves more detail spectral and spatial information. New hybrid image fusion rules are also proposed. Proposed method is applied on number of registered Panchromatic and Multispectral images and simulation results are compared with standard image fusion parameters. The proposed method simulation results also compared six different standard and recently proposed Pan sharpening methods. It has been observed that simulation results of our proposed algorithm is consistent and preserves more detailed spatial and spectral information and better visual quality compared to earlier reported methods.

Analysis of Mammograms using Fractal features (#54)
Deepa Sankar and Tessamma Thomas

Medical images like mammograms are very difficult to analyze because of their low contrast. In this paper use of fractal features for analyzing mammograms are presented. The new fractal feature derived from the modified average image is found to be a better feature for distinguishing between normal, malignant, benign and mammograms with microcalcifications. The study is performed on the mammograms obtained from the MIAS database. The average values of the new normalized fractal

feature for normal, mammogram with microcalcifications, benign and malignant tumors are obtained as 0.15, 0.45, 0.3132, and 0.5375 respectively.

Data Diverse Fault Tolerant Architecture for Component Based Systems (#70)
Arijit Sil, Oishila Bandyopadhyay and Nabendu Chaki

Of late, component based software design has become a major focus in software engineering research and computing practice. These software components are used in a wide range of applications some of which may have mission critical requirements. In order to achieve required level of reliability, these component-based designs have to incorporate special measures to cope up with software faults. This paper presents a fault tolerant component based data driven architecture that is based on C2 architectural framework and implements data diverse fault tolerance strategies. The proposed design makes a trade-off between platform flexibility, reliability and efficiency at run time and exhibits its ability to tolerate faults in a cost effective manner. Application of proposed design is exhibited with a case study.

A Basic Concept of Displaying Electronic Text with Seamless Pages -Magnifying And Simplifying System for Text EXTension (MaSSTExt) (#98)
Seiji Sugiyama, Miyuki Shibata, Atsushi Ikuta, Susumu Saito and Seiki Miyashita.

In this paper, we propose a new system for enhanced viewing of electronic text. It is named "Magnifying And Simplifying System for Text EXTension (MaSSTExt)". This system for displaying text has the operational feeling like a map system displayed on a web browser. No link buttons are used for changing the other pages in this system because it is made by using Ajax. Then, it allows us to display huge text files in only one window or seamlessly display/not-display from index to body or annotation data. As using this system, footnotes, references, tables and figures on the text can be located at optimal positions. Comparing simultaneously two different texts is easy to read. Grasping a text with both a bird's-eye view in its totality and a detailed view can be easy. Simulation software "MaSSTExt" of our prototype system is introduced and the effectiveness of our research is shown.

**CISIM SS4 Information Systems and Security   Dec 10, 2009   17.15-19.00   Venue: Y202
Chair(s): J. Dvorsky and A. Abraham**

CAM Based High-Speed Compressed Data Communication System Development using FPGA (#4)
Tribeni Prasad Banerjee, Amit Konar and Ajith Abraham.

In this paper we propose a Lossless data compressor in high level throughput using re programable FPGA technology.Real time data compression is expected to play a crucial role in high rate data communication applications. Most available approaches have largely overlooked the impact of mixed pixels and subpixel targets, which can be accurately modeled and uncovered by resorting to the wealth of spectral information provided by hyperspectral image data. In this paper, we proposed an FPGA-based data compressor on the concept of CAM and Dictionary based compression technique has been proposed in this paper . It has been implemented on a Xilinx Spartan3 -II FPGA formed by several millions of gates, and with high computational power and compact size, which make this reconfigurable device very appealing for onboard, real-time data processing.

Large Quasigroups in Cryptography and their properties Testing (#20)
Eliska Ochodkova, Jiri Dvorsky, Vaclav Snasel and Ajith Abraham

One of the current trends in cryptography is to search for new approaches to the cryptographic algorithms design. One such possibility is to use the other algebraic structures, such as a quasigroup, rather than the traditional. Quasigroups are equivalent to more familiar Latin squares. One of quasigroups' important properties is that all possible elements of certain quasigroup occur with equal probability. Testing properties of quasigroups of a large order isn't trivial, effective methods are necessary. There are described statistical experiments on various types of data, on various types of

guasigroups in this paper; experiments were done within a framework of a simple quasigorup hash function. The distribution of hash value's changes, for given quasigroup and for given testing data, with respect to bit change in them and with respect to the positions of changed bits were measured.

Quantitative Security Risk Assessment (SRA) Method: An empirical case study (#79)
Danilo Valeros Bernardo, Bee Bee Chua and Doan Hoang.

This paper introduces a novel approach to a more practical Quantitative SRA. The approach formalized in this paper is based on the methods described in various risk assessment frameworks that were described by existing international standards with adjustments combining qualitative and ranking method based on distance-based approach. The implementation of this approach in four organizations provides an alternative conventional means of performing a more practical Quantitative SRA, in a manner consistent with current set of standards and practices.

Morphological analysis and reconstruction techniques for computer tomography (#94)
V.E. Asadchikov, A.I. Chulichkov, A.V. Buzmakov, M.V. Chukalina, D.P. Nikolaev, R.A. Senin and Gerald Schaefer.

In this paper we discuss the results of morphological analysis of test object in high-noise conditions and we compare image reconstruction using two widely employed methods of computer tomography, namely Filtered Back Projection and Algebraic Reconstruction Technique. In our test tomography experiments, we used a laboratory X-ray source designed and manufactured at the Institute of Crystallography, Moscow, Russia.

CISIM SS5   Pattern Recognition I   Dec 11, 2009   9.00-10.45   Venue: Y202
Chair(s): S. Shamsuddin and H. Drias

Intelligent System for Arabic Character Recognition (#3)
Khalid Saeed, Majida Bakoor and Fadel Sukkar

A new system for Arabic letters recognition is designed and implemented. New approaches for segmentation, processing, classifying and hence recognition of characters and scripts are shown. The research concentrates on two important subjects: First, segmentation on the basis of word histogram and baseline estimation; a convenient algorithm is worked out for this aim. Second, the process of feature extraction to find the most useful points is implemented upon the given algorithm. Feature coding is executed according to a new algorithm - a string of eight digits through two counterclockwise passes. The code is filtered up provided with eight basic pairs. The filtered code goes through processing to form an array of 9*9 elements, in addition to an array of 2*2 elements determined to resemble four parts of the extracted character image. These 85 elements are the input to a Backpropagation Neural Network (NN) used for classification purposes. A 98.7% rate of recognition is achieved for Arabic character classification. Results have proved high recognition of Arabic letters of multi fonts and multi sizes. They have also assured that computing time is negligible with very small errors.

Efficient Image Tamper Detection and Recovery Technique using Dual Watermark (#12)
Surya Bhagavan Chaluvadi and MVNK Prasad

In this paper, we proposed an efficient dual watermark scheme for image tamper detection and recovery. In the proposed watermarking algorithm each block in the image contains watermark of other two blocks, i.e. two copies of watermark of the whole image is maintained and second chance for block recovery is provided in case one copy is destroyed. The algorithm proposed by Lee and Shinfeng [1] is unable to detect the tamper in the watermarked image, if any one bit or more than one bit in 5-MSBs (most significant bits) is changed. In this paper we demonstrated the attacks and concluded that there is a flaw in their watermarking technique and the attacker can tamper a watermarked image easily without being detected and results are compared. Experimental results show that our proposed dual watermark technique is efficient.

Evolutionary algorithms for fast and accurate watermark retrieval (#13)
E.V. Gopal, MVNK Prasad and V. Ravi

A Watermark hidden in an image is retrieved differently fro m the original watermark due to the frequently used round in g approach. The simple rounding will cause numerous errors in the embedded watermark especially when it is large. Evolutionary algorithms (EA) are used to correct the rounding errors. The main issue before applying EAs to reduce the rounding errors is that the embedded data should be retrieved correctly. Evolutionary algorithms are commonly used as adaptive approaches that provide a randomized , parallel and global search method based on the mechanics of natural selection and natural genetics in order to find solutions of problems.
We present the application of Genetic algorithms (GA), Differential Evolution (DE) and Simplified Threshold Accepting algorithm (STA) to enhance the watermark retrieval. Experimental results show that STA converges faster to the optimal solution than DE, which in turn converges faster than GA.

CISIM SS6   Pattern Recognition II   Dec 11, 2009   11.00-12.45   Venue:Y202
Chair(s): P. Porwik and N. Chaki

A View-based Approach for Recognition of Bengali Printed Characters (#102)
S. H Shaikh, N. Chaki, M. Tabedzki, K. Saeed

This paper presents a method for recognizing Bengali printed characters by using view-based and layer-based approaches. Two different view-based approaches, the top-bottom and the left-right have been used. The layer-based approach is also considered here. No thinning or segmentation is required. The individual character is taken as a whole image. The characteristic points are extracted from the views after some preprocessing. These points are then used to form a feature vector which represents the given character. These feature vectors are classified with the aid of Dynamic Time Warping distance, k-NN and Ensemble of Classifiers. The concept can also be extended for Bengali word recognition.

A Support Vector Machine Classifier of Emotion from Voice and Facial Expression Data (#45)
Pavel Bhowmik, Sauvik Das and Amit Konar.

The paper provides a novel approach to emotion recognition from facial expression and voice of subjects. The subjects are asked to manifest their emotional exposure in both facial expression and voice, while uttering a given sentence. Facial features including mouth-opening, eye-opening, eyebrow-constriction, and voice features including, first three formants: F1, F2, and F3, and respective powers at those formants, and pitch are extracted for 7 different emotional expressions of each subject. A linear Support Vector Machine classifier is used to classify the extracted feature vectors into different emotion classes. Sensitivity of the classifier to Gaussian noise is studied, and experimental results confirm that the recognition accuracy of emotion up to a level of 95% is maintained, even when the mean and standard deviation of noise are as high as 5% and 20% respectively over the individual features. A further analysis to identify the importance of individual features reveals that mouth-opening and eye-opening are primary features, in absence of which classification accuracy falls off by a large margin of more than 22%.

A Three Tier Scheme for Devanagari Hand-printed Character Recognition (#37)
Satish Kumar.

In this paper, a three tier strategy is suggested to recognize the hand-printed characters of Devanagari script. In primary and secondary stage classification, the structural properties of the script are exploited to avoid classification error. The results of all the three stages are reported on two classifiers i.e. MLP and SVM and the results achieved with the later are very good. The performance of the proposed

scheme is reported in respect of recognition accuracy and time. The recognition rate achieved with the proposed scheme is 94.2% on our database consisting of more than 25000 characters belonging to 43 alphabets. The recognition rate has further improved to 95.3% when a conflict resolution strategy between some pair of characters is used.

A new signature similarity measure (#91)
Piotr Porwik, Rafal Doroz and Krzysztof Wrobel.

The paper presents a new signature similarity measure and new efficient method of recognizing handwritten signatures. Each signature is represented as a set of features such as coordinates of signature points, pen pressure, and speed of writing. Proposed approach consists in dividing signature into windows and calculating similarity values between individual windows. The influence of the size of windows and their location in a signature has been analysed. Additionally, the influence of individual features on the signature similarity value has been examined.

Software Cost Estimation using Computational Intelligence Techniques (#1)
Jankisharan Pahariya, Ravi Vadlamani and Mahil Carr

This paper presents computational intelligence techniques for software cost estimation. We proposed a new recurrent architecture for Genetic Programming (GP) in the process. Three linear ensembles based   on (i)arithmetic mean (ii) geometric mean and (iii) harmonic mean are implemented. We also performed GP based feature selection. The efficacy of these techniques viz. Multiple Linear Regression, Polynomial Regression, Support Vector Regression, Classification and Regression Tree, Multivariate Adaptive Regression Splines, Multilayer FeedForward Neural Network,Radial Basis Function Neural Network, Counter Propagation Neural Network, Dynamic Evolving Neuro-Fuzzy Inference System, Tree Net, Group Method of Data Handling and Genetic Programming has been tested on the International Software Benchmarking Standards Group (ISBSG) release 10 dataset. Ten-fold cross validation is performed throughout the study. The results obtained from our experiments indicate that new recurrent architecture for Genetic Programming outperformed all the other techniques.

NaBIC -CISIM   Poster Sessions I   Dec 09, 2009   17:15 – 17.45

NaBIC 2009 Posters
Chair(s): R. Marshall and M. Maximiano

Genetic algorithm based reduction of electromagnetic field pollution (#23)
Tomislav Rolich and Darko Grundler.
Paper describes method for finding transmitter parameters (location, power and horizontal direction) for optimal electromagnetic radiation distribution in the observed area. Constraints are protected areas inside the observed area where strength of electric field is limited because of a permanent people presence. In the observed area one wish to obtain strength of electric field which is higher than lower limit value to cover the area with enough reception signal strength. On the other side electric field inside protected areas has to be lower than prescribed upper limit determined by a health hazard. Those two conditions are contradictory. In here described investigation a genetic algorithm is used to find transmitter parameters (location, power and horizontal direction) constrained by above mentioned conditions. Investigation is limited to a rectangular planar observing area with one transmitter and with different formation and size of protected areas. Procedure has been repeated and results statistically analyzed. Based on those results it can be concluded that a procedure is applicable and it is justified to continue investigations for more complex and more realistic situations e.g. more than one transmitter with directed radiations and for a three dimensional spaces.

Evolving Solutions to the School Timetabling Problem (#188)
Rushil Raghavjee and Nelishia Pillay.

There has been a large amount of research into the development of automated systems for creating school timetables. Methodologies such as constraint programming, simulated annealing, and Tabu search have been applied to many school timetabling problems. The research presented in this paper forms part of work-in-progress aimed at evaluating genetic algorithms as a means of solving the school timetabling problem. In previous work a genetic algorithm was successful applied to solving the school timetabling problem with hard constraints. The paper presents a first attempt at extending this system to cater for school timetabling problems with both hard and soft constraints.

Cooperative Coevolutionary Invasive Weed Optimization and its Application to Nash Equilibrium Search in Electricity Markets (#144)
Hossein Hajimirsadeghi, Amin Ghazanfari, Ashkan Rahimi-Kian and Caro Lucas.

This paper presents a coevolutionary algorithm named cooperative coevolutionary invasive weed optimization (CCIWO) and investigates its performance for global optimization of functions with numerous local optima and also Nash equilibrium (NE) search for games. Based on the novel and distinct qualifications of invasive weed optimization (IWO) and coevolutionary algorithms (CEAs), CCIWO is introduced which combines their excellent features together. Properties of CCIWO such as speed of convergence and optimality of the results are tested through a set of common benchmarks of function optimization. Reported results are compared with genetic algorithms, particle swarm optimization and some other evolutionary and coevolutionary algorithms. In advance, a three-bus transmission-constrained electricity market model is studied, and CCIWO is employed to find NE for this complex system. The experimental results show that the proposed method makes faster and better solutions than other algorithms.

GaTMo: Game Theoretic Trust Model for Peer to Peer Networks (#48)
Siddarrthraman.R, Vignesh Laligam Sundaresan, Ganesh Kumar. M

Peer to Peer networks can be seen as truly distributed computing applications in which peers communicate directly with one another to exchange information, distribute tasks, or execute transactions. The issues with peer to peer network are that the resource is not centralized. Moreover, peers may not know about the trustworthiness of other, so the trust framework should be designed in such a way that the peers reputation can be identified based on the services provided by them. This paper discusses the design of GaTMo a trust framework for evaluating the trust of peers in a network. The trust framework incorporates self experience and reputation to calculate trustworthiness of a peer. Various like Game theoretic strategies are used for selecting peers for doing the peer selection process. The experimental results prove that the GaTMo works effectively for different strategies thereby increasing the payoff of each peer which indirectly increases the life time of the peer to peer network.

Adaptive Control for Nonlinear Systems Based on Quasi-ARX Neural Network (#133)
Wang Lan, Yu Cheng and Jinglu Hu.

When a linear model is used for controlling nonlinear systems solely, it can't satisfy accuracy requirement. Whereas, although a neural network can deal with the accuracy problem, it may lead to instability. In this paper, an adaptive controller is proposed for nonlinear dynamical systems based on linear model and quasi-ARX neural network model. A switching algorithm is designed between the linear and nonlinear models. Theory analysis and simulations are given to show the effectiveness of the proposed method both on stability and accuracy.

A Dynamic Pattern Recognition Approach Based on Neural Network for Stock Time-Series (#147)
Bo Zhou and Jinglu Hu.

Pattern theorem in financial time-series is one of the most important technical analysis methods in financial prediction. Recent researches have achieved big progresses in identifying and recognizing

time-series patterns. And most of the recent works on time-series deal with this task by using static approaches and mainly focus on the recognition accuracy, but considering that recognition of patterns in financial time-series, especially for stock time-series, are always time-consuming rather than pattern recognition in other fields, a dynamic recognition approach is more preferable so that investment on stock pattern become executable. In this paper we propose a dynamic approach for extracting and recognizing the patterns in stock-series. In our approach a slide window with flexible length is defined for extracting feature vertexes in stock-series, and in addition, a dynamic perceptual important point (PIP) locating method is proposed based on the PIP locating method for avoiding the computation expense problem and an artificial neural network (ANN) approach is involved for pattern recognition and window length identification.

t - Communicating Iso-Array P System (#257)
Annadurai S, Kalyani T, Dare V.R and Thomas D.G

Membrane computing (P systems), is an interesting area of research in the study of formal string language theory in recent years. Many deep results have been obtained in this study. Recently iso-array rewriting P systems have been developed in the context of two-dimensional picture description. In this paper, we introduce iso-array rewriting P system with t-communication and analyze the power of this system and compare it with the other systems developed earlier by the authors.

Coordinator Selection in Distributed Systems: Cellular Automata Model Based Approach (#239)
Kalyna Mahata and Sukanta Das.

This paper reports a scheme that selects a process as a coordinator from a set of n processes of a distributed system. The scheme demands only O(n) messages in worst case to select a leader. In the proposed scheme, each process maintains a partial view of the global state of the system, and that view enables the system to select a coordinator in an efficient way.

Is Stochastic Ranking really better than Feasibility Rules for Constraint Handling in Evolutionary Algorithms? (#241)
Sulabh Bansal, Ashish Mani and Patvardhan C

Evolutionary Algorithms have been widely used to solve difficult constrained optimization problems. However, Evolutionary algorithms are intrinsically unconstrained optimization techniques. Constrained handling is incorporated additionally and its choice has great bearing on the quality of the solution. Stochastic Ranking was introduced as an improvement over Feasibility Rules for handling constraints in Evolutionary Optimization. It is widely believed that stochastic ranking is currently the best known technique for handling constraints. However, a fair comparative study has never been attempted in the literature, where by the performance of both the constraint handling technique is compared on the same Evolutionary Algorithm. In this paper an evaluation of the performance of both these constraint handling techniques on the same Evolutionary Algorithm over a set of parameters like feasibility rate, successful run, success rate and success performance in addition to objective function value and number of function evaluations. The results put a question mark over the belief that Feasibility Rules are worse than Stochastic Ranking.

CISIM 2009 Posters
Chair(s): R. Marshall and M. Maximiano

Auditing Public Key Infrastructure Systems: An agent based approach (#11)
Arun Babu P, Sivakumaran M V and Dhavale N P.

With rapid increase in PKI enabled applications in various electronic transactions, it has become very important to audit the deployed PKI System regularly and to understand the effectiveness of the system. In this paper we propose an agent-based approach to audit a PKI System.

Design Methodology Internal Sub State Observer Using CPLD (#26)
Tribeni Prasad Banerjee and Rangeen Basu Roy Chowdury.

One of the constraints of classical logic is its rigid nature of response against a binary input for which it cannot predict some obvious fact till the it actually happens. One way to remove this constrain is to soften the constraints of Boolean logic and allow truth value which is measured in grey scale. A state observer generally monitors the state(health) of a system with reference to time. In general the health of a system can be estimated by good or bad and is responsive through a Boolean logic. Under these circumstances it is difficult to predict when health (state) will change from good state to bad state. The reason behind this is it cannot recognize a 'degraded state'- in proper time before turned in to a bad state. Thus it necessary to convert it to a grey scale with proper truth value. In order to impose this aspect - health is estimated by its 'duration of work' - which measured and associated with a degraded state in terms of a specific time duration. The main objective of the current paper is to design and validate a sub sate observer which can communicate the health status of the stitching needle to the stitch controller in right time without any false alert signal. This has been achieved through a design methodology of a fault aware controller which can interact with a stitch controller for automatic decorative cricket ball stitching machine.

Review on Ant Miners (#33)
V.K. Panchal, Poonam Singh, Appoorv Narula, Ashutosh Mishra and Nitish Paliwal
Extracting classification rules from data is an important task of data mining and is gaining considerable attention in recent years. This paper comprises classification of different types of rule extraction algorithm and their comparative study by considering their advantages separately. These Ant Colony based algorithms called as Ant_Miner have been successfully implemented in various fields such as remote sensing problems ,combinatorial problems, scheduling problems and the quadratic assignment problem .No single algorithm is efficient enough to tackle related problems arising from different fields. Hence, in this paper we present several Ant_Miner algorithms which can be used according to one's need.

Performance of Hierarchical Agent based Wireless Sensor Mesh Network for Patient Health Monitoring (#38)
Benjamin Norman and Suresh Sankaranarayanan

Wireless sensor network (WSN) has become a significant technology and Wireless (body) sensors can be deployed on patients to continually monitor their physiological health conditions. These body sensors are very tiny devices and when attached to the human patient body would eliminate the need for continuously monitoring by a nurse/doctor. The wireless body sensors can then be configured to convey the patient's status directly to the assigned doctor/nurse through the personal smart phone, PDA or Palm device. In this situation, Wireless Mesh Networks (WMN) can be used to transmit vital information arising form the wireless Body sensor Network (WBSN) to the backbone network. It may be mentioned that WMN which is an extension of LAN, has far better range involving very little wiring. The integration of WBSN and WMN technologies, results in Wireless Sensor Mesh Network (WSMN) and this technique has already been proposed by one of the authors of this paper, for usage in the medical field. In this paper we present the results on the performance of such a WSMN used for patient health monitoring application, in terms of parameters like delay, MAC delay and throughput under varying number of patients and varying number of doctors in wards, based on simulation study carried out with Opnet modeller 15.0.

NaBIC 2009 Posters
Chair(s): R. Outi and C. Bee

Traffic Organization by Utilization of Resources Through Grid Computing Concept
(#116)
Subhamita Mukherjee, Indrajit Pan and Kashi Nath Dey.
Recent progress in grid computing concept and its allied application technologies has helped us to device an efficient tool for heavy workload management. Concept of this middle ware technology supports to build more and more complex application which can process large real time data set. Mobilization of under utilized resources among the needy processes can easily be carried out with distributed grid computing concept. In a real life scenario of a city, we have experienced traffic hazards as a daily phenomenon. There we often trail through to a well known regular path to avail our destination. This leads to an over utilization of the path, which can cause in serious congestion and delay. In our work we have considered the crisscross roads as resources, those cross sections as junctions and different kind of vehicles as processes. We have designed and simulated a method at several cross points between a pair of source and destination to study its response against a real time data set. This simulation has shown effective prospect in computing the real time congestion scenario between a source and destination pair. This mode of computing will help in efficient traffic management by directing the vehicles for some alternative well suited options of path to reach its destination more conveniently. Some effective decision makings in this regard have been performed depending upon the calculated congestion.

Design of decoder in quantum computing based on spin field effect (#158)
Saeid rafiei, Amir Abolfazl Suratgar, Avat Taherpour and Abolghasem Babaei.

In this paper we present a new method for designing of decoder in quantum computing based on field effect on nuclear spin. We use nuclear property of hydrogen in order to logical truth value. Computational results demonstrating the accuracy and efficiency that can be obtained with the use of these models are presented.

Modeling amino acid strings using electrical ladder circuits (#75)
Roger Marshall.

Amino acid strings (proteins) have been modeled as electrical ladder circuits using passive circuit elements such as resistors, inductors and capacitors and the frequency responses of these circuits have been computed. For long strings which may or may not be folded a macroscopic model based on electrical transmission lines can also be obtained. An analysis of the computational results indicates that the electrical ladder analogs can prove useful in tracking changes in protein composition and protein structure (e.g. metabolic pathways) without resorting to expensive and time consuming experiments in medical or pharmaceutical laboratories.

Systems Biology Markup Language for Cancer System (#94)
Avishek Das, Suryasarathi Barat and Durjoy Majumder

In literature it has been mentioned that several factors are responsible for the successful accomplishment of cancer therapy. Moreover, during the course of treatment patients has undergone different physiological states. In recent time several analytical models are developed to address these issue and further progresses are in the process. This actually prompted us to develop a multi-modal reasoning decision-support system based on some rationality that has already been addressed in those models and in cancer literature. This would help in the development of a coherent system model for cancer therapy.

Biogeography Based Land Cover Feature Extraction (#165)
Samiksha Goel, VK Panchal and Mitul Bhatnagar

Recent developments in applied and heuristic optimization methods used for feature extraction from satellite images have been strongly influenced and inspired by natural and biological system. The findings of recent studies are showing strong evidence to the fact that some aspects of the biogeography can be applied to solve specific problems in science and engineering. The algorithm based on this paradigm, Biogeography Based Optimization is investigated in this paper by applying it to detect various features from multi-source satellite images. This algorithm is based on the geographical distribution of biological organisms. It is modeled after the immigration and emigration of species between islands in search of more friendly habitats. The original BBO algorithm does not have the inbuilt property of clustering. However, in this paper we have introduced a modified BBO algorithm. This recent and novel approach is used to make the clusters of different land cover features. The results indicate that highly accurate land-cover features can be extracted effectively when BBO is used, instead of other conventional classifiers.

Localization using Average Landmark Vector in the presence of clutter (#196)
Pratik Chaudhari.

Extensive research has shown that various biological species navigate very successfully in complex and cluttered environments with limited sensory and computational capabilities. A key concept that has emerged from this study is the use of topological maps for navigation. The core aspect of topological maps are the properties (usually some environmental features) used to define the nodes of the map. In this paper we use a well known technique adopted by desert ants called visual piloting for autonomous robot navigation. This technique works by extracting a useful feature from the environment and calculating the Average Landmark Vector (ALV) with all such features. This is a first step in using environmental features with ideas inspired from ants/bees, and will form the basis of building and using topological maps for robot navigation. We present ALV in terms of a gradient descent mechanism for the nest being at the centroid. We also present results from an implementation on the robot platform. We extend current results to the case of navigating in a cluttered environment. Furthermore we extend a well known technique from robotics, the Vector Field Histogram, to navigate using the ALV.

Transaction Mapping Based Approach for Mining Software Specifications (#220)
R. Jeevarathinam Jeeva and Antony Selvadoss Thanamani Antony.

Specification mining is a machine learning approach for discovering specifications of the protocols that code must obey when interacting with an application program interface or abstract data type. Two major concerns in engineering software systems are high maintenance costs and reliability of systems. To reduce maintenance efforts, there is a need for automated tools to help software developers understand their existing code base. So, there is a need to extract specifications to aid program comprehension. In this paper a novel technique to efficiently mine software specifications, called TM_TraceMiner is proposed which mines software specifications from program execution traces. The Transaction Mapping algorithm is currently one of the fastest approaches. To address the limitations of Apriori-like methods and FP-growth methods, a mining paradigm has been proposed, which uses Transaction Mapping algorithm. Experimental data shows that this method outperforms the other two methods.

Application Of Neural Network To Estimation Dimension of Muscle Cracks In Eddy Current Testing (#221)
Abolghasem Babaei and Saeid Rafiei.

Eddy current (EC) nondestructive testing (NDT) based on probe impedance changes in the crack regions is considered in this paper. For this a numerical simulation is introduced for the development of the EC-NDT system using 3D finite element software. This model is used to simulate the muscle cracks with various dimension and prepares the data required for artificial neural network. The neural network estimates dimension of new cracks using impedance changes of eddy current probe.

A State-of-the-art Review of Population-based Parallel Meta-heuristics (#266)
Madhuri Gupta and Kusum Deep.

In this paper, we applied the Artificial Bee Colony Algorithm (ABC) to the object recognition in the images. ABC is a new metaheuristics approach inspired by the collective and individual foraging behavior of honey bee swarm. The objective is to find a pattern or reference image (template) of an object somewhere in a target landscape scene, considering that it may be translated, scaled, rotated and/or partially occluded. This will result in location of the given reference image in the target landscape image. Results of the experiments with grayscale and color images show that the ABC is faster than other evolutionary algorithms and with comparable accuracy.

Solving Nonconvex Trim Loss Problem using an Efficient Hybrid Particle Swarm Optimization (#267)
Kusum Deep, Pinkey Chauhan and Jagdish Chand Bansal.

Trim loss is one the most common problem arising in process industries. Its mathematical model is a nonconvex mixed integer nonlinear programming problem subject to several constraints. In this paper we consider four hypothetical cases of trim loss problem taken from literature [1] and propose an efficient approach based on Particle Swarm Optimization namely ILXPSO for solving trim loss problem.

Multiobjective Particle Swarm Optimization Approach to Portfolio Optimization (#200)
Sudhansu Kumar Mishra, Ganapati Panda and Sukadev Meher.

The problem of portfolio optimization is a standard problem in financial world and has received a lot of attention. Selecting an optimal weighting of assets is a critical issue for which the decision maker takes several aspects into consideration. Here we consider a multi-objective problem in which the percentage of each available asset is selected such a way that the total profit of the portfolio is maximized while total risk to be minimized, simultaneously. Four well-known multiobjective evolutionary algorithms i.e. PSFGA, SPEA2, NSGA2 and MOPSO for solving the bi-objective portfolio optimization problem is used. Performance comparison carried out in this paper by performing different numerical experiments. These experiments are performed using real-world data. The results show that MOPSO outperforms other two for the considered test cases.

Comparative Analysis of Neural Model and Fuzzy Model for MR Brain Tumor Image Segmentation (#12)
Jude Hemanth D, Kezi Selva Vijila C and Anitha J

Artificial Neural Networks (ANN) and Fuzzy systems are the widely preferred artificial intelligence techniques for biological computational applications. While ANN is less accurate than fuzzy logic systems, fuzzy theory needs expertise knowledge to guarantee high accuracy. Since both the methodologies possess certain advantages and disadvantages, it is primarily important to compare and contrast these two techniques. In this paper, these two techniques are analyzed in the context of MR brain tumor image segmentation. Real time abnormal MR brain images are used in this work. A comprehensive feature vector is formed from these images. An optimization algorithm is used to select the significant features. These features are used to train the representative of neural networks namely Linear Vector Quantization (LVQ) network and the Fuzzy C-means (FCM) algorithm which belongs to the category of fuzzy systems. An extensive analysis and comparison is performed in terms of segmentation efficiency and convergence time period. Experimental results show promising results for the neural classifier over the fuzzy classifier in terms of the performance measures.

An Overview of Neural Networks in Simulation Soccer (#264)
William Plant and Gerald Schaefer.

This paper reviews applications of neural networks (NNs) in the domain of 2D simulation soccer. We divide these into the employment of NNs for the training of low level and high level skills as well as coaching clients involved with high-level strategies. We conclude that the use of NNs has yielded success in these areas, but their future use may now be primarily limited to building a foundation of skills which can be advanced through manual hardcoding.

A Reconfigurable FPGA Framework for Data Fusion in UAV's (#191)
Veera Ragavan Sampath Kumar, Ganapathy Velappa and Ming Xian Chong.

This paper presents the results of an effort to develop a reconfigurable helicopter platform capable of autonomous flight using a reconfigurable FPGA Framework to fuse the data from sensors, Readings from accelerometer and absolute GPS Location data is fused using Kalman filter to combine the low frequency stability of GPS systems with the high frequency tracking of accelerometers thus achieving stable static and dynamic three-degree-of-freedom tracking for the use of an UAV onboard navigational system. The sensor data can have different data rates and noise figures. Simulation was done on data fusion of noisy GPS and accelerometer data using Kalman filter. The results showed the data fusion of the sensors gives a better positional and velocity estimates decreasing the average errors of positional and velocity estimates by more than 50%. More over the fused data does not accumulate error over time, as compared to positional and velocity estimates obtained earlier.

CISIM 2009 Posters
Chair(s): R. Outi and C Bee

Pattern Extraction Methods for Ear Biometrics - A Survey (#52)
Ramesh Kumar Panneer Selvam.

The Human Ear is a new class of relatively stable Biometrics that has drawn researcher's attention recently. Human ear is a perfect data for passive person identification, which can be applied to provide security in the public places. In this article, we overview the proposed Pattern extraction algorithms from 2D and 3D Ear images.

Group-oriented signature schemes based on Chinese remainder theorem (#61)
Porkodi Ganesan and R.Arumuganathan Ramalingam.

This paper is an extension work of the paper "Group-oriented signature schemes on exponentiation of primitive root and Elliptic curve" published in Journal of Information Assurance and Security. Two group signature schemes are developed using Chinese remainder theorem, the first one is based on exponentiation of primitive root of a prime field and the second one is based on elliptic curves. A trusted arbitrator is involved in the schemes for the construction of the group key and individual participant keys. The constructed keys are used as long run keys. The group signature generated by the trusted arbitrator, from the partial signatures of the participants. The proposed schemes are secured, since the security of the schemes depends on the NP-hard integer factorization problem, discrete Logarithm problem and elliptic curve discrete logarithm problem. The security analysis discussed in detail. The signature schemes illustrated using MATLAB7.0 and Mathematica 6.0.

A New Protocol Model for Verification of Payment Order Information Integrity in Online E Payment System (#67)
Sandeep Raghuwanshi, Mr. R.K. Pateria and R.P. SIngh.

Two parties that conduct a business transaction through the Internet do not see each other face-to-face nor do they exchange any document or currency hand-to-hand. Electronic payment is a way by which the two parties transfer the money through internet. Offering electronic payment can also help businesses improve customer retention. When electronic money is transferred from a buyer to a seller over telecommunications networks, accuracy and security is critical. Several methods are proposed which satisfies the basic requirements of E payment. Despite all these the integrity of payment and order information of online purchase is an important concern. With the online purchase the customer and merchant can not be assumed to be complete honest or they can act to change the either payment information or the order information. In this paper we proposed a mathematical model which can be used to verify the integrity of payment and order information of online purchase. The model is based on third party verification which except two different messages from customer and merchant and verifies the integrity. The model is also analyzed on the two points when customer and merchant are not honest.

Receiver Based Packet Loss Replacement Technique for High Quality VoIP Streams (#78)
Kanapathy Maheswari.

Voice over Internet Protocol is a growing technology that enables voice communication through the Internet. The transmission of audio data over packet switched networks faces lot of difficulties by a variety of network impairments. Such networks are not designed to support real time voice communication because of their variable characteristics. The conversational quality of a VOIP communication is dependent on several factors such as networking conditions, coding process used, speech content, type of error correction, flowid. The factors which affects the Quality of Service (QoS) is due to delay, delay variation, packet loss, repeat - request, loss rate, QOS control, throughput, network security, network reliability, providing bandwidth, voice compression, echo suppression and jitter on the perceived conversational quality. Packet loss is a serious and critical issue for voice over internet protocol applications. It degrades the performance of voip. This paper focuses on packet loss which is a crucial problem to be addressed. This paper provides a Packet loss replacement mechanisms and discusses their suitability for use in IP based networks by using a receiver based repetition technique. It performs better quality monitoring of VoIP service at the receiver side. The obtained results suggest that the overall quality of voice can be quite beneficial for real time applications.

Characterizing L2 Cache Behavior of Programs on Multi-core Processors: Regression Models and Their Transferability (#101)
Jitendra Kumar Rai, Atul Negi, Rajeev Wankar and K. D. Nayak.

In this study we investigate the transferability of trained regression models to estimate solo run L2 cache stress of programs running on multi-core processors. We used machine learning to generate the trained regression models. Transferability of a regression model means how useful is a regression model (which is trained on one architecture) to predict the solo run L2 cache stress on another architecture. The statistical methodology to assess model transferability is discussed. We observed that regression models trained on a given L2 cache architecture are reasonably transferable to other L2 cache architecture and vice versa.

Doctoral Symposium papers Dec 08, 2009 09:30 – 11:00 **Venue: Y 301**
Chair(s): M.Pant and R. Jain

Using Neural Networks to Identify More Proteins in High-Throughput Proteomics (#3)
Leo McHugh.

Protein identification using mass spectrometry is a critical step in many areas of the life sciences, and in proteomics in particular. To confirm the presence of a protein in a sample, at least one of the constituent peptides from that protein must be matched to a theoretical peptide sequence. The prediction of a fragmentation spectrum from a theoretical sequence so that it can be compared to an observed spectrum is the key challenge of protein identification algorithms. We present a study using artificial neural networks to learn properties of fragmentation spectra so that more peptides and therefore proteins can be identified in high-throughput proteomics.

Applications of Parallel Genetic Algorithms in Groundwater Contamination (#30)
Sunita Sharma.

Groundwater resource management is a challenging problem faced by almost all the countries. Mathematical models of these problems often turn out to be illdefined subject to several variables and constraints. Sophisticated algorithms are needed in order to deal efficiently with such problems. In the past few decades much attention has been paid to heuristic techniques like genetic algorithms etc which can easily solve such problems. Further, in order to tackle the large number of involved

parameters in these problems parallel version of GAs is more effective than the basic GAs. In this paper an attempt is made to review the application of PGA on groundwater management problems.

Modified Differential Evolution Algorithms For Global Optimization (#25)
Musrrat Ali

Optimization problems are ubiquitous and consequential. In fact every sphere of human activity that can be quantified can be formulated as an optimization problem. The focus of my work is on Global Optimization which is not only desirable but also necessary in many cases. In the past few decades several Global optimization algorithms have been suggested in literature out of which stochastic, population based search algorithms like Genetic algorithms (GA), Evolutionary Strategies (ES), Swarm Algorithms (Ant Colony (ACO) and Particle Swarm (PSO)), differential Evolution etc. have become immensely popular for solving real life optimization problems. The reason, being the efficiency with which these algorithms can tackle the complex and intricate models of real life problems. My research is concentrated on Differential Evolution which is relatively a newer addition to the population based search algorithms. DE was first suggested by Storn and Price in 1995 as a search technique for solving optimization problems. It uses the same operators like mutation, crossover and selection as that of GA but manipulates them in a manner different to that of GA.

NaBIC – CISIM 2009 Cultural Programme

NaBIC – CISIM 2009 features Indian classical dances on December 09, 2009 after the conference technical programme.

Bharata Natyam stands in the forefront of all the classical dance arts now prevalent in India, owing to its religious origin and its highly developed technique. Bharata Natyam was the dance technique evolved in the South of India in Tamilnadu and practiced in the temples of Shiva. It is a highly specialised science with a traditional background and rigid codes and conventions. Bharata Natyam skillfully embodies the three primary ingredients of dancing. They are bhava or mood, raga or music and melody and tala or timing. The technique of Bharata Natyam consists of 64 principles of coordinated hand, foot, face and body movements which are performed to the accompaniment of dance syllables.

Cymbals made of iron or bronze for Natuvangam, Mrudangam, Veena, and Thamboora were the instruments used in early days. Now they use electronic Thamboora, Clarinet, Violin, Flute, Morching, Mrudangam, Thabala. Sometimes for special effects Chande and keyboard are used.

After Independence, the Gazetteer of India and the Constitution of India have recognised seven classical dances as Indian classical dances, namely: Bharathanatyam, Kathakkali, Mohiniattam, Kuchipudi, Manipuri, Kathak and Odissi.

Kathakkali is a famous traditional dance of Kerala, It is performed by selecting themes form Ramayana, Mahabharatha and Bhagavatha. This is a dance performed only by men. The students begin to learn this dance from their seventh year and practice it for seven years.

Mohiniattam is another traditional classical dance of Kerala. Elegance is a main feature of this dance. Only women perform this dance. The word Mohini implies dazzling beauty. Sholkattu and Pandattam are its main items.

Kuchipudi dance owes its origin to the Brahmins of kuchipudi, a village in Andhra Pradesh. It has developed as a dance drama from the 15th century. Bhamakalapam and Prahlada Charitham are some of the popular dance-dramas of Kuchipudi.

Kathak is a famous traditional dance of North India. Those who were narrating the stories of God were called kathakas. Kathakas were even dancing while narrating the stories. Thus the name kathak originated. This dance was very popular during the period of the Mughals.

Odissi is a classical dance of Orissa as well as India. The history of this dance goes back to the third century B.C. according to the Ranigumpha inscription. There are many dance sculptures pertaining to this dance in Bhuvaneshwar and konark temples.

Manipuri dance dates back to the 2nd century. This is a classical dance of Manipura as well as India. 'Raas' dance is the main part of this dance. Theme of this dance is Krishna Leela.

Visit to Isha Yoga Centre
Velliangiri Hills, Coimbatore

India is the only country in the world where religions have not just taken birth but a large number of them have evolved, flourished and have grown from strength to strength.   Of the major religions in the world, Hinduism, Buddhism, Jainism and Sikhism were born in India. Islam can be compared to an adopted child as it has been an inseparable part of the Indian social and cultural fabric, for centuries. Judaism, Christianity, Zoroastrianism and Baha'ism also have flourished in India. Religion is not just an integral part of life but has had a powerful influence on the personal lives of the Indian milieu. Despite numerous invasions, persecution, colonialism and political upsurges and the prevalence of numerous faiths, languages, caste and creeds, India has stood strong and by and large has struggled to remain free of internecine strife.

Thus, the Sacred land of India has been witness to the lives of countless seers, saints, sages, and enlightened beings from all religions and faiths. The Dhyanalinga Yogic Temple, situated near Velliangiri Hills, Coimbatore, India, is very much a part of this glorious tradition.

Yoga is both a philosophy and a science, intertwined and inseparable and reinforcing each other. Though arising within the traditions of Hinduism, Yoga stands alone as a methodology and is not affiliated to any religion per se. To say that Yoga only stands for a series of physical exercises that ensures good health and vigor is only to limit its potential and power. The term "yoga" actually describes the state in which a person experiences oneness with the whole existence. Yogic practices are simply a method by which one prepares the body, mind and spirit to arrive at and exist in such a state.

Dhyanalinga Temple and Isha Yoga Centre, Velliangiri Hills, Coimbatore
Excerpts from http://www.dhyanalinga.org/about.htm

Known for its diversity of flora and fauna, the Nilgiris biosphere is one of the most scenic places of South India. Amidst the thick tree cover, dancing rivulets, imperious peacocks and trumpeting elephants, at the foothills of the Velliangiri mountains, is the artistic and tranquil Isha Yoga Center, located about 28 kms from Coimbatore. Spread across 150 acres of land, the ashram houses Dhyanalinga temple, Spanda meditation hall, Isha Rejuvenation Center, Isha Home School, Yogic Hospital and also cottages for visitors. The Isha Yoga Center, created under the aegis of Isha Foundation is a popular destination attracting people from all parts of the world and is unique in its offering of all the four major paths of yoga - gnana(knowledge), karma (action), kriya (energy), and bhakthi (devotion).

Architectural Marvel
…The architecturally distinctive Spanda Hall and garden, a 64,000 sq.ft pillar less meditation hall and program facility is the venue for residential isha yoga programs and temple celebrations. The dominating feature of this space is the exquisite wall mural painting, depicting the life of the first yogi, Shiva. Measuring 140 x 12 ft, this masterpiece of art is the largest of its kind in the world. The style of painting - a dying art from the temple town of Guruvayur in the state of Kerala, uses only vegetable dyes and earth extracts. …

Dhyana, in Sanskrit, essentially means meditation, and Linga means, the form. The first form is a Linga and the final form before dissolution is also a Linga. A Linga or perfect ellipsoid can be energized in various ways, to serve different purposes. It is one form that when energized becomes a perennial storehouse of energy. The yogic science of making a Linga is based on this knowledge. Dhyanalinga is the distilled essence of yogic sciences, it is an outer manifestation of the peak form of inner energies.

The elliptical dome that houses the Dhyanalinga is 76 feet in diameter and 33 feet high. It was built without the use of any steel, cement, or concrete but with brick and mud mortar stabilized with lime, sand, alum and herbal additives. It's the only structure of its kind. The simple technology used is this -- all the bricks are trying to fall down at the same time! But, the way the bricks are aligned and balanced, they can never fall. The nature of this design ensures a lifespan of at least 5000 years for the dome.

About Coimbatore

The third largest city of the state, Coimbatore, is one of the most industrialized cities in Tamil Nadu. Known as the textile capital of South India or the Manchester of the South, the city is situated on the banks of the river Noyyal. Coimbatore existed even prior to the 2nd or 3rd century AD by Karikalan, the first of the early Cholas. Among its other great rulers were Rashtrakutas, Chalukyas, Pandyas, Hoysalas and the Vijayanagara kings. When Kongunadu fell to the British along with the rest of the state, its name was changed to Coimbatore and it is by this name that it is known today, except in Tamil, in which it is called Kovai.

In the rain shadow region of the Western Ghats, Coimbatore enjoys a very pleasant climate all the year round, aided by the fresh breeze that flows through the 25 kms long Palakkad gap. The rich black soil of the region has contributed to Coimbatore's flourishing agriculture industry and, it is in fact the successful growth of cotton that served as a foundation for the establishment of its famous textile industry. The first textile mills came as far back as 1888 but there are now over a hundred mills. The result has been a strong economy and a reputation as one of the greatest industrial cities in South India.

There are more than 25,000 small, medium, large sale industries and textile mills. Coimbatore is also famous for the manufacture of motor pump sets and varied engineering goods. The development of Hydro electricity from the Pykara Falls in the 1930 led to a cotton boom in Coimbatore.

Coimbatore serves as an entry and exit point to neighbouring Kerala and the ever popular hill station of Udhagamandalam (Ooty). It is the disembarking point for those who want to take the Mountain train that runs from Mettupalayam, just 35 kms from Coimbatore. There are also regular bus services from Coimbatore to Ooty.

Places of Interest

Kovai Kutralam
Situated at Siruvani Hills at a distance 37 km away from Coimbatore, Kovai Kutralam is an enchanting waterfall, known for its magnificence. The visitors are not allowed to see the falls after 5 pm as it located in the center part of a dense forest. The Siruvani river that makes this beautiful waterfall is the main source of water supply to Coimbatore city. The water in this river is famous for its taste and it is typically known to be the second sweetest lake water in the world.

Karamadai Forest Range
The spot is located at an easy destination reachable for people from Coimbatore, Tirpur, Ooty, Metupalayam, etc. It is located near Pillur in Baralikkadu of Karamadai Range, one of the Range in Coimbatore Division. The way is a hilly terrain enriched with green vegetation with a pleasant climate.. On Saturdays and Sundays you can enjoy a Coracle Ride in Bhavani River with delicious lunch, trekking and river bath. The ride covering a distance of 5 km on the cool water with mountains and forest on either side gives us a rare sight. You can also stop by the banks to have a walk into the jungle as you like. A nice bath in the running water with the pleasant breeze gives a cooling effect and a great relief.

Indira Gandhi wild life sanctuary
The Indira Gandhi Wildlife Sanctuary and National Park, the largest and well preserved sanctuary in Tamil Nadu, lies in the Western Ghats south of the Palghat Gap, better known as Anaimalais (Mountain of Elephants). With an area of 958 sq.KM, it is rich in flora and fauna.This protected area constitutes the most important watershed for the agricultural

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economy and power supply. Major reservoirs like Parambikulam, Aliyar, Thirumurthi, Upper Aliyar, Kadambarai, Sholayar and Amaravathi are fed by the perennial rivers which originate from the Sanctuary.

Valparai

Valparai is one of the highest mid elevation hill resort in the country. The tea plantations are surrounded by evergreen moist deciduous forest with a rich elephant tract and a panther prowl

Ootacamund

Ootacamund is a popular hill station located in the Nilgiri Hills. Located in the Blue Mountains of the Western Ghats, Ooty draws a large number of tourists every year. Lofty mountains, great lakes, dense forests, sprawling grasslands, miles of tea gardens and eucalyptus trees greet the visitors en route to Ooty. The hill station itself is a land of picturesque picnic spots.

Maruthamalai Temple

Maruthamalai Temple, situated on a hillock, about 12 kms from Coimbatore, is an important temple dedicated to Lord Muruga. The temple gets its name from the Marutha trees in the forests on the hill. The hills also have many medicinal herbs in their forests. The drive up the hills is very scenic and once you reach the top you get a birds eye view of Coimbatore.

Perur Temple

Perur which is 7 kms away from Coimbatore is famous for the Mel Chidambaram Temple situated near river Noyyal and dedicated to Lord Shiva. 6 Kms west of the city centre, Perur has one of seven Kongu Sivalayams, a temple of great sanctity.The outer buildings were erected by Thirumalai Nayaka of Madurai between 1623-1659 but the inner shrine is much older.

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(Venue of the Conference: PSG College of Technology   Place: Peelamedu)