

## Title: Cohort Intelligence Algorithm

The tutorial intends to make the participant researchers aware of emerging AI optimization technique referred to as Cohort Intelligence (CI). The tutorial may include a presentation on the introduction and motivation of CI, its mechanism and an illustration. The participants could be encouraged to solve a test problem using paper and pencil. This hands-on session will help them in investigating the nooks of the methodology. An overview of CI methodology is discussed below.

An emerging Artificial Intelligence (AI) technique referred to as Cohort Intelligence (CI) was proposed by Kulkarni et al. in 2013 at the IEEE SMC Conference Manchester, UK [1]. It is inspired from the self-supervised learning behavior of the candidates in a cohort. The cohort here refers to a group of candidates interacting and competing with one another to achieve some individual goal which is inherently common to all the candidates (Refer to Figure 1). When working in a cohort, every candidate tries to improve its own behavior by observing the behavior of every other candidate in that cohort. Every candidate may follow a certain behavior in the cohort which according to it may result into improvement in its own behavior. As certain qualities make a particular behavior which, when a candidate follows, it actually tries to adapt to the associated qualities. This makes every candidate learn from one another and helps the overall cohort behavior to evolve. The cohort behavior could be considered saturated, if for considerable number of learning attempts the individual behavior of all the candidates does not improve considerably and candidates' behaviours become hard to distinguish. The cohort could be assumed to become successful when for a considerable number of times the cohort behavior saturates to the same behavior.

So far the algorithm of CI has been tested and applied solving several unconstrained benchmark test problems [1]. Also, several cases of the combinatorial problem such as 0-1 single knapsack problem have been successfully solved [2]. In addition, CI is modified by incorporating a mutation approach and further hybridized with K-means algorithm to solve several machine learning (clustering) problems [3]. Currently, the ability of CI for solving complex combinatorial problems in the Cross-border Supply Chain as well as Healthcare domain is being investigated.



Cohort with Individuals

## References

1. Kulkarni, A.J., Durugkar I.P., Kumar M. (2013): "Cohort Intelligence: A Self Supervised Learning Behavior", in Proceedings of IEEE International Conference on Systems, Man and Cybernetics, Manchester, UK, 13-16 October 2013, pp. 1396-1400
2. Kulkarni, A.J., Shabir, H. (2014): "Solving 0-1 Knapsack Problem using Cohort Intelligence Algorithm". International Journal of Machine Learning and Cybernetics, (DOI 10.1007/s13042-014-0272-y)
3. Krishnasamy, G., Kulkarni A.J., Paramesaran, R. (2014): "A hybrid approach for data clustering based on modified cohort intelligence and K-means", Expert Systems with Applications, 41(13), pp. 6009-6016