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**Title:** Landscape analysis of optimisation and machine learning search spaces.

**Abstract:** The notion of a fitness landscape was first introduced in 1932 to understand natural evolution, but the concept was later applied in the context of evolutionary computation to understand algorithm behaviour on different problems. In the last decade, the field of fitness landscapes has experienced a large upswing in research, evident in the increased number of published papers on the topic as well as regular tutorials, workshops and special sessions at all the major evolutionary computation conferences. More recently, landscape analysis has been used in contexts beyond evolutionary computation in areas such as feature selection for data mining, hyperparameter optimisation, neural network training and neural architecture search. This talk will provide an overview of the applications of landscape analysis for understanding complex problems and explaining algorithm behaviour in optimisation and machine learning. Particular emphasis will be placed on the use of landscape analysis for intelligent algorithm selection. In addition, a new modelling and visualisation technique called Search Trajectory Networks (STNs) for analysing search landscapes through the trajectories of algorithms will be presented. What algorithms "see" as they move through the search space of different problems can help us understand how search algorithms behave on problems with different characteristics. Case studies will be presented of recent applications of landscape analysis in both discrete and continuous optimisation domains including examples from the domain of machine learning.

**Biography:** Katherine Malan is an associate professor in the Department of Decision Sciences at the University of South Africa. She has 25 years' lecturing experience, mostly in Computer Science, at three different South African universities. Her research interests include fitness landscape analysis and the application of computational intelligence techniques to real-world problems. She is particularly interested in the link between complex problem characteristics and algorithm behaviour with the aim of achieving intelligent automated algorithm selection. She serves as the editor-in-chief of South African Computer Journal, associate editor for Engineering Applications of Artificial Intelligence and actively reviews for over 20 Web of Science journals and many conferences in artificial intelligence, computer science and operations research.