

Where are they and what do they look like?

Discovering patterns in data using statistical mixture models

Data analysis is central to almost every business, government and industry group, underpinning evidence-based decisions and informed management. An important component of this analysis is the identification of patterns and subgroups in the data. Statistical Mixture Models are a very powerful and flexible tool for this purpose and have successfully been employed in a wide range of fields including genetics, finance, astronomy, social statistics, epidemiology, error-correcting codes, forensic science and ornithology.

Kerrie Mengersen is Professor of Statistics and Director of the Centre for Data Analysis, Modelling and Computation at Queensland University of Technology, Australia. In her presentation, Kerrie will discuss the way in which Statistical Mixtures have enabled greater insight into the following problems:

- *Describing patterns in environmental data* – How does air pollution change over time? How can we use remotely sensed data to describe and monitor water quality in the Barrier Reef and vegetation change over large landscapes?
- *Improving medical understanding* – How can we use symptom, image and signal data to identify subgroups of patients who respond well to treatment for Parkinson's Disease? Who will suffer 'chemo-brain' after treatment for breast cancer? How is migraine described, and what are the genetic indicators?
- *Building networks* – By extending the models underlying Statistical Mixtures to Bayesian Networks, we can gain better insight into the conservation of cheetahs in Southern Africa, airport security practices and whole-of-life large asset management.