

SARAH ROMANES, **University of Sydney**

*Using Variational Approximations to Efficiently Build a Generalised Discriminant Analysis (genDA) Algorithm*

Discriminant Analysis (DA) methods, such as LDA and QDA, have long been used as effective classifiers for correlated, Gaussian data. However, the use of such classifiers is restricted when: a) The data is non-Gaussian, and/or b) The number of features is larger than the number of observations. Although diagonal discriminant analysis and Factor analysis based methods have been developed successfully to address problems arising from b), the challenge to develop DA methods for non-Gaussian data remains open. In this talk, we introduce our generalised DA method (genDA) as a novel attempt to extend DA for non-Gaussian responses. This method utilises Bayesian Generalised Linear Latent Variable Models (GLLVMs) to capture the correlation structure between features, and effectively using this information to classify new data points. Variational approximations are used to estimate such GLLVMs, with efficient optimisation routines implemented using Automatic Differentiation techniques provided by the 'TMB' package in 'R'. We will show performance results on simulated as well as real data, as well as address future directions for the development of this model.