

**Joint CSIRO & Macquarie University
Statistics Department Seminar**

Speaker: Professor Peter J. Green, University of Bristol, UK, and UTS, Sydney.

Date: Tuesday 3 April 2012, Time 4pm

Venue: CSIRO Building E6B, Room 136

Title: Identifying influential model choices in Bayesian hierarchical models

Abstract:

Real-world phenomena are frequently modelled by Bayesian hierarchical models. The building blocks in such models are the distributions of each variable conditional on parent and/or neighbour variables in the graph. The specifications of centre and spread of these conditional distributions may be well-motivated, while the tail specifications are often left to convenience. However, the posterior distribution of a parameter may depend strongly on such arbitrary tail specifications. This is not easily detected in complex models.

In this paper we propose a graphical diagnostic which identifies such influential statistical modelling choices at the node level in any chain graph model. Our diagnostic, the local critique plot, examines local conflict between the information coming from the parents and neighbours (local prior) and from the children and co-parents (lifted likelihood). It identifies properties of the local prior and the lifted likelihood that are influential on the posterior density. We illustrate the use of the local critique plot with applications involving models of different levels of complexity. The local critique plot can be derived for all parameters in a chain graph model, and is easy to implement using the output of posterior sampling.

This is joint work with Ida Scheel (Oslo) and Jonty Rougier (Bristol)

About the speaker:

Professor Peter Green is a statistical scientist, principally interested in Bayesian inference in complex stochastic systems, Markov chain Monte Carlo methodology, forensic genetics, Bayesian nonparametrics, and graphical models. He holds an Emeritus Professorship and Professorial Research Fellowship at University of Bristol, as well as a Distinguished Professorship at UTS.

Professor Green has been awarded a Royal Society Wolfson Research Merit Award (2006-11), Fellowship of the Royal Society (2003), Chartered Statistician (2001), Guy Medal in Silver, Royal Statistical Society (1999), Fellowship of the Institute of Mathematical Statistics (1991) and Guy Medal in Bronze, Royal Statistical Society (1987). He was President of the Royal Statistical Society (2001-2003) and of the International Society for Bayesian Analysis (2007).