Shrinkage Estimation of Nonlinear Models

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School of Physical and Mathematical Sciences

Recent developments in shrinkage estimation are remarkable. Capable of shrinking some coefficients to exactly 0, the penalized approach combines continuous shrinkage with automatic variable selection. In this talk, I will discuss the methodology and application of the shrinkage estimation from the following two aspects. 1. We propose to employ the adaptive LASSO approach in threshold variable selection of smooth threshold autoregressive (STAR) model. Moreover, by penalizing the direction of the coefficient vector in this nonlinear model, the threshold variable is more accurately selected. 2. We propose a novel varying coefficient model, called principal varying coefficient model (PVCM), by characterizing the varying coefficients through linear combinations of a few principal functions. Model estimation and identification are investigated, and the better estimation efficiency is justified theoretically. Incorporating the estimation with the $L_1$ - penalty, variables in the linear combinations can be selected automatically and hence the estimation efficiency can be further improved. Numerical experiments suggest that the model together with the estimation method are useful even when the number of covariates is large.

Speaker Biography

Dr. Jiang Qian received her bachelor's and master's degrees in Statistics from Nanjing University in 2003 and 2006 respectively. She took up an appointment as a full-time lecturer in the department of General Education at the Macau University of Science and Technology from September 2006 to August 2007, where she published a paper on stochastic optimal control of assemble-to-order systems in the Probability in the Engineering and Informational Sciences. She then pursued her doctoral studies at National University of Singapore and obtained her Ph.D. in Statistics in June 2012. Her research interests focus on semiparametric modelling, dimension reduction and time series analysis. She published two papers in the Journal of the American Statistical Association and Statistics and its Interface respectively. From February 2011 till present, she has been working as a quantitative analyst at DBS Bank Ltd.

Host: Division of Mathematical Sciences, School of Physical and Mathematical Sciences