Stochastic model specification search for state space and dynamic survival models

Helga Wagner
Johannes Kepler Universität Linz, Austria
helga.wagner@jku.at

State space models are widely used in time series analysis to deal with processes which gradually change over time. Model specification however is a difficult task as one has to decide which components to include in the model and to specify whether these are fixed or stochastic.

Using a Bayesian approach the posterior probabilities could be determined for each model separately, which requires estimation of the marginal likelihood of each model by some numerical method. The modern approach to Bayesian model selection is to apply model space MCMC methods by sampling jointly model indicators and parameters, as e.g. in the stochastic variable selection approach. The stochastic variable selection approach is usually applied to select covariates in a classical regression models but may be extended to deal with model selection problems in various latent variable models.

In this talk we discuss a variable selection approach for state space models that chooses appropriate components in a structural time series model (seasonal components, trend, intervention) and decides, whether these components are deterministic or stochastic. For non-Gaussian state space models for binary and multinomial or count data this stochastic model search MCMC method makes use of auxiliary mixture sampling.

The method is extended further to dynamic survival models, where it allows to identify covariates with non-zero effects and to decide whether these effects are constant or vary over time.