

Modern State Space methods: a workshop for practitioners

Diego J. Pedregal

Universidad de Castilla-La Mancha

Ciudad Real (Spain)

State Space (SS) is a very powerful and flexible framework for time-series analysis and forecasting, whether in economics, business and industry, or other fields. Though it has been attractive to many researchers, its development has been intimidating for practitioners, for whom it remains an obscure technique buried beneath a heap of statistical theory. This workshop aims at overcoming such a point of view by showing how friendly the SS setup may become, especially when appropriate tools are at hand. This is crucially relevant to practitioners because their needs have to do with the use of flexible methods and tools, like is certainly the case of SS methods.

The workshop covers, time permitting: i) a non-technical introduction to SS models (notation, specification, estimation, filtering and smoothing, forecasting, etc.); ii) implementation of univariate models, typically Exponential Smoothing, Unobserved Components (either Basic Structural Model or Dynamic Harmonic Regression) and ARIMA models; iii) implementation of multivariate models; iv) modelling linear transfer functions and non-linear and time varying regression effects; v) automatic identification of models; vi) imposing arbitrary linear or non-linear constraints among parameters; vii) non-Gaussian and non-linear SS models; viii) alternative, not-likelihood related, heuristic estimation methods; ix) block concatenation of systems and nesting on inputs or errors; x) advanced topics, like time aggregation and hierarchical approaches to forecasting.

Previous modelling possibilities are illustrated on a number of case studies on hot topics, mainly demand and supply chain forecasting (e.g., bullwhip effect and demand drivers like trend, seasonal, prices, promotions, weather, etc.), big datasets automatic modelling and forecasting, energy forecasting and macroeconomic modelling.

The teaching style is agile, non-technical and informal though rigorous, focusing on the practical implementation and coding of the illustrative case studies, starting from some standard and well-known and drifting smoothly away towards more eclectic ones. All the examples and exercises are supplied with coded solutions. The instructor will be available prior and after the workshop for questions, suggestions, and any query the attendants would like to address to him.

All the examples are implemented in MATLAB® and R, though previous knowledge of these platforms is not strictly essential to follow the workshop.