Dynamic chain graph models for multivariate time series forecasting

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Consider the problem of forecasting an n-dimensional time series in which context-specific information implies a set of conditional independence relationships related to causality across its components. Such data can be modelled by using graphs to represent the causality structure among the components of the time series. Using graphs in this context enables a multivariate time series problem to be split up into models of lower dimensions. The multiregression dynamic model explores this idea by considering directed acyclic graphs to break a multivariate model into (conditionally) univariate Bayesian dynamic models. However, this model assumes null covariance among the time series represented by the nodes without parents in the directed acyclic graph, which may not hold in practice. For example, in traffic modelling, dependence structures may be present among time series of flows entering a traffic network. It will be shown in this talk how this dependence can be accommodated by using chain graphs to represent high-dimensional time series, resulting in the class of dynamic chain graph models. Minute-by-minute data collected at the intersection of three motorways in the UK will be used to illustrate this new class of model.

ABSTRACT	BISP8.07
TYPE	Young researcher Osvaldo Anacleto invited to contribute