



Contribution ID: 66

Type: **not specified**

On stochastic network trends in network time series

In many applications of interest, multivariate time series data feature trend behaviors. Yet, trends that may affect multivariate stochastic processes are still largely dealt with in a univariate manner. Calling on differencing and co-integration concepts for univariate time series, we introduce stochastic trends for multivariate data, with particular focus on trends that are constrained by an underlying network. When introduced into an auto-regressive time series model, stochastic network trends allow practitioners to fit models that assume the component time series to move together, can discriminate between what comes from the network and what is only influenced by the past and whose sparsity is a priori enforced through the network.

Such stochastic network trends embed contemporaneous effects in a matrix, and estimating this matrix through an ordinary least squares approach leads to inconsistent estimators. Hence, we propose to estimate this trend matrix using maximum likelihood estimation and transform a network-constrained optimization problem into an unconstrained one. We show that the objective function for this problem is strongly convex in the trend parameters and propose an efficient algorithm for estimation based on block coordinate descent. We show that this algorithm converges to a stationary point, and that the corresponding estimators are consistent.

Special/ Invited session

Young statisticians

Classification

Mainly methodology

Keywords

multivariate time series; auto-regressive models; networks

Primary author: PIERROT, Amandine (University of Bath)

Co-authors: Prof. NASON, Guy (Imperial College London); Prof. NUNES, Matthew (University of Bath)

Presenter: PIERROT, Amandine (University of Bath)

Track Classification: Other/special session/invited session