Working Group on Statistical Learning Seminar

Title: Latent space approaches for multivariate count time series data

Speaker: Hardeep Kaur (UCD)

Date: Thu 1st February 2024 at 3:00PM

Location: E0.32 (beside Pi restaurant)

Abstract: We introduce a novel approach that unifies models for multivariate time series with the Latent Position model (LPM) to model networks derived from count data. The proposed model provides a hierarchical framework using the Poisson model. Our framework consists of two well-known models: the log-linear vector autoregressive (VAR) model, prominent in the literature on multivariate count time series, and the Projection model, a popular latent variable network model. We incorporate the Projection model approach into a matrix of autoregressive coefficients of VAR to uncover the underlying network associated with the pairwise relationship among the series in the multivariate time series data. Furthermore, we quantify the strength of complex pairwise interactions between the series. Estimation and inferential procedures are performed using an optimization routine and the Hamiltonian Monte Carlo procedure. We illustrate the merits of our model through a simulation study and empirically examine its behavior using real datasets. The framework of the model provides a clear illustration of the pairwise relationships between multivariate time series data. It also describes the global topology of the network, aids in the identification of hidden patterns, and facilitates data forecasting.