



Statistics and Actuarial Science Seminar

Title: Bayesian community detection in assortative stochastic block model with unknown number of communities

Speaker: Pierpaolo de Blasi (University of Torino)

Date: Thu 2nd October 2025 at 3:00PM

Location: E0.32 (beside Pi restaurant)

Abstract: Structured data in the form of networks is increasingly common in a number of fields, including social sciences, biology, physics, computer science, and many others. A key task in network analysis is community detection, which typically consists of dividing the nodes into groups such that nodes within a group are strongly connected, while connections between groups are relatively scarcer. A generative model well-suited for the formation of such communities is the assortative stochastic block model, which prescribes a higher probability of a connection between nodes belonging to the same block rather than to different blocks. A recent line of work has utilized Bayesian nonparametric methods to recover communities in the SBM by placing a prior distribution on the number of blocks and estimating block assignments via collapsed Gibbs samplers. However, efficiently incorporating the assortativity constraint through the prior remains an open problem. In this work, we address this gap, aiming to study the effect of enforcing assortativity on Bayesian community detection and so identify under what scenario it pays its dividends in comparison with standard SBM. We illustrate our findings through an extensive simulation study. Technical report available at <https://arxiv.org/abs/2506.19576>