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SEMINAR

DEPARTMENT OF STATISTICS

THE CHINESE UNIVERSITY OF HONG KONG

Regression Models for Reciprocity in Directed Graphs

INVITED SPEAKER

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TIME

May 29th, 2025 (Thu) · 2:30 pm - 3:30 pm

VENUE

LSB C3 (G/F) · Lady Shaw Building C3 · CUHK

ABSTRACT

Reciprocity—the tendency for directed edges to occur in mutual pairs—is a fundamental feature of many real-world networks, yet it remains challenging to model statistically, particularly in the sparse regime. In this talk, I present a modeling framework that incorporates covariates to characterize reciprocity in directed networks.

The first model introduces a novel Bernoulli formulation that distinguishes between reciprocal and non-reciprocal edges. We propose an associated inference procedure and provide a detailed analysis of effective sample sizes corresponding to different components of the model's parametrization, offering insight into identifiability and estimation efficiency under sparsity.

The second model extends the classical p_1 framework by incorporating link-specific reciprocity in addition to node-specific heterogeneity. We develop a new estimation approach based on a conditioning argument and derive theoretical guarantees for the resulting estimator. Numerical experiments support the theoretical findings and demonstrate the model's practical performance.