Characterizing Agents’ Interactions in Networks

Many large networks emerge from the interactions of individual agents. Online social networks, gene regulatory networks, and the human brain are some important examples. This talk will discuss a framework using probabilistic graphical models for analyzing observational time-series to identify and characterize the local interactions that underlie the complex, global system dynamics. The framework includes non-parametric measures of dependencies between time-series, algorithms to infer the exact and approximate topologies, and estimation techniques. The talk will also cover recent efforts to disentangle joint interactions into synergistic, redundant, and unique parts. The methods have been applied to data from online social networks, neuroscience, and biomedical science.