

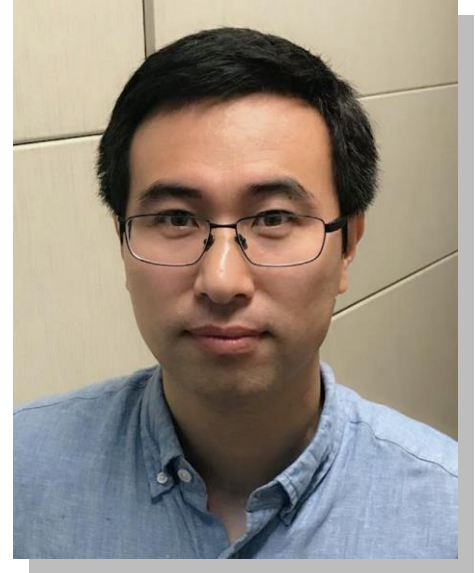


CoCo Seminar Series

Fall 2020

Detecting Dynamic States of Temporal Networks Using Connection Series Tensors

**Shun Cao, PhD candidate in Systems Science
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Wednesday September 2, 2020 11:00am-12:00pm

Online (Zoom meeting link available on <http://coco.binghamton.edu/>)

Many temporal networks exhibit multiple system states, such as weekday and weekend patterns in social contact networks. The detection of such distinct states in temporal network data has recently been explored as it helps reveal underlying dynamical processes. A commonly used method is network aggregation over a time window, which aggregates a subsequence of multiple network snapshots into one static network. This method, however, necessarily discards temporal dynamics within the time window. Here we develop a new method for detecting dynamic states in temporal networks using information regarding the timeline of contacts between each pair of nodes. We apply a similarity measure informed by the techniques of processing time series and community detection to sequentially decompose a given temporal network into multiple dynamic states (including repeated ones). Experiments with empirical temporal network data demonstrated that our method outperformed the conventional approach using simple network aggregation in revealing interpretable system states. In addition, our method allows users to analyze hierarchical temporal structures and to uncover dynamic state at different spatial/temporal resolutions.

Shun Cao is a PhD candidate in the Systems Science Graduate Program at Binghamton University. His research interests include network science, data analytics, computational social science, and agent-based modeling. For more information, contact Hiroki Sayama (sayama@binghamton.edu).
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