



## Channing Network Science Seminar

March 7 (Wednesday), 2018, 3pm @ 3rd-floor conference room



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### From Networks to Time Series

Complex networks have been used to analyze nonlinear dynamics, in the form of time series data. Integrating different time points in a time-series data to construct a network has shown that networks can be tool to characterize nonlinearity in the time series. However, complex networks themselves have large amount of information embedded in higher dimensional space and unraveling that may be fruitful to better understand the underlying associations in the data. In this talk we propose reverse concept with a framework to transform a complex networks into a time-series data. The transformation from complex networks to time series is realized by the classical multidimensional scaling. We identify the temporal patterns i.e. the time series as signature of the underlying network topologies like, regular lattice, small-world networks and random networks. We also show that the relationships between networks and their signature time-series are analytically held by using the circulant-matrix theory and the perturbation theory of linear operators. The results are generalized to several high-dimensional lattices.

Bio: Yutaka Shimada, Ph.D., is a young faculty at the Saitama University. His research focusses on characterizing temporal properties of networks from the perspective of nonlinear dynamics. He is developing novel framework to analyze nonlinear time series and complex networks.

Hosted by Abhijeet Sonawane