

报告人: Jianxi Gao (Northeastern University, MA, USA)

题 目: Controlling Network of Networks

时 间: 6 月 4 日(周二)15:00-16:00

地 点: 电院群楼 2-406

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Abstract:

Network science has revealed the complexity pertaining to both structural properties and dynamical behaviours in many natural and technological systems. Our ability to control those real networks is essential. Recently network controllability is formalized as driving a network from any initial state to any desired state in finite time, with the minimum number of inputs. However, it is neither feasible nor necessary to control the entire network in many circumstances. This prompts us to study how to control a part (i.e., a subset of target nodes of a network), instead of the whole network. Here we propose a greedy algorithm to study this *partial controllability*, concerning our ability to steer the dynamics of a part of the network to any desired state, with the identification of approximate minimum number of inputs. Our results demonstrate that partial controllability has fundamentally different features in complex networks compared with that of full controllability. For example, we find that degree heterogeneous networks can be partially controllable with higher efficiency than degree homogeneous networks. Moreover, many real-world networks may have been optimized to have efficient partial controllability. Furthermore, we apply the partial control method to control a network of networks, and we find that it is better to drive the denser network when both networks have similar degree profile; and it is better to drive the more homogeneous network when both networks share the same connectivity.

Biography:

Jianxi Gao is a postdoctoral researcher working with Laszlo Barabasi in Northeastern University in USA since 2012. His research interests are robustness and controllability of complex networks as well as network of networks, percolation theory, multi-agent system. Dr. Gao obtained his master and PH.D degree in Shanghai Jiao Tong University in 2008 and 2012 respectively. Dr. Gao was a research fellow in Physics department in Boston University working with H. E. Stanley and Shlomo Havlin from 2009 to 2012. He develops a general analytical framework for studying percolation of n interdependent networks and illustrate the analytical solutions for many distinct examples. He has one paper published in Nature Physics (IF>7), one in Physical Review Letters (IF>7), and 7 in Physical Review E (IF>2). He is the referee of several journals, such as: Europhysics Letter, New Journal of Physics, Physical Review E etc..