BRIGHAM AND WOMEN'S HOSPITAL
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Department of Medicine
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Channing Network Science Seminar

March 20, 2015, 11am @ 5th floor conference room

Speaker: Wei Chen, Ph.D
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Explosive percolation in random graphs

Abstract: Percolation, describing the sudden emergence of large-scale connectivity as edges are added to a lattice or random network, is a theoretical underpinning for analyzing properties of networks, including epidemic thresholds, vulnerability and robustness. Typically the large-scale connectivity is emerging in a smooth and continuous transition. Recently, the local rules that lead to a discontinuous percolation phase transition was investigated intensively in a class of models which was named as "explosive percolation". In this talk, we will show our study on how the discontinuous percolation transition emerges in a special class of models--- the Bohman-Frieze-Wormald model, by controlling the growth of large components in the graph. We will also show some interesting features observed in this model, including multiple giant components, a hybrid of continuous and discontinuous transitions by tuning certain parameters, which provides possible methods to control the gel sizes in plolymerization and community sizes in social networks. Finally, we find that microtransitions in the early evolution show localized resonances which are independent of systems sizes. The precursory microtransitions allow us to target almost deterministically the location of the transition point to global connectivity. This may extends to the class of intrinsically stochastic processes the possibility to use warning signals anticipating phase transitions in complex systems.

Bio: Wei Chen is currently a postdoctoral reserach associate at Center for complex network research in Northeastern University. Prior coming to Northeastern University, he was working in Institute of Computing Technology, Chinese Academy of Sciences as an assistant professor. Wei Chen got Ph.D. from School of mathematical sciences at Peking University in 2012, where he was supervised by professor Raissa M.D'Souza and Zhiming Zheng to study percolation in random graphs. Before he got Ph.D., he has also been visiting Univeristy of California, Davis, City University of Hong Kong, National University of Singapore as a visiting scholar to study complex networks for a few years.

Hosted by Yang-Yu Liu