UNCLASSIFIED

Information Science and Technology Seminar Speaker Series

June Zhang
Carnegie Mellon University

Impact of Topology on Dynamical Processes Over Networks

Wednesday, April 22, 2015

3:00 - 4:00 PM

TA-3, Bldg. 1690, Room 102 (CNLS Conference Room)

Abstract: Networks capture relationships between interactive agents in a population. Dynamical processes, such as epidemics, over networks is frequently used as models to understand how information/virus/rumors/ opinions/failures spread amongst agents in a heterogenous population. The inclusion of heterogenous network structure introduces combinatorial complexity to the problem for which few exact solutions exist. We developed the scaled SIS (susceptible-infected-susceptible) process, a binary-state, epidemics process over arbitrary, finite-size network, which accounts for both spontaneous and neighbor-to-neighbor infection as well as healing. The scaled SIS process has an exact, closed-form equilibrium distribution of the Gibbs form and depends on the underlying network structure through the adjacency matrix.

Further, the most-probable configuration (i.e., ground state) of the equilibrium distribution can be found in polynomial-time for a range of infection/healing rates using submodular optimization. Through the most-probable configuration, we can relate the severity of the epidemics to the existence of 'denser-than' subgraphs in the network and identify exactly the set of agents that would be more susceptible to infection.

Biography: June Zhang received her B.S. with Highest Honor in Electrical and Computer Engineering from the Georgia Institute of Technology and a M.S. in Electrical and Computer Engineering from Stanford University. She is currently a Ph.D. student in Electrical and Computer Engineering at Carnegie Mellon University.

She was a recipient of the Georgia Hope Scholarship, National Science Foundation Graduate Research Fellowship, and the Microsoft Azure Research Fellowship 2015. She is a participant of the 2015 Science of Signatures Advanced Studies Institute at the Los Alamos National Laboratory. Her research interests are stochastic processes, network science, complex systems, human computer interaction, and design methodology. She is very fond of koalas.

For more information contact the technical host David Mascareñas, dmascarenas@lanl.gov, 665-0881.

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