BRIGHAM AND WOMEN'S HOSPITAL

HARVARD MEDICAL SCHOOL

181 Longwood Avenue
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Department of Medicine
Channing Division of Network Medicine

Channing Network Science Seminar
April 10, 2015, 11am @ 5th floor conference room

Speaker: Maksim Kitsak, Ph.D. in Physics
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Latent Geometry in Technological, Social and Biological Systems

Abstract: The prediction and control of the dynamics of networked systems is one of the central problems in network science. Structural and dynamical similarities among different real networks suggest that an underlying set of universal laws might accurately describe the dynamics of these networks, albeit the nature and common origin of such laws remain elusive. Do these universal laws exist? We do not have the answer to this question… yet. I will talk about the latent geometry approach to networked systems, which I believe could be a first step toward the formulation of the universal laws of network dynamics. Within the approach, networks underlying complex systems are viewed as discretizations of smooth geometric spaces: network nodes are points in these spaces and the probability of a connection between any two nodes is fully determined by the distance between them: the smaller the distance, the higher the probability of a connection. I will start my presentation with a motivation and a high level introduction of the latent geometry concept. I will continue with a (semi) rigorous discussion of the mathematics underlying the approach as well as the computational algorithms for uncovering latent geometries of real systems. I will conclude my talk with applications of the latent geometry approach to (i) interdomain routing in the Internet, (ii) uncovering molecular mechanisms of human diseases, and (iii) understanding large-scale dynamics of networked systems.

Further details are available at http://www.northeastern.edu/mkitsak/

Hosted by Yang-Yu Liu