Topology and Geometry of Networks and Discrete Metric Spaces

IMA Annual Thematic Program Workshop
April 28 - May 2, 2014

Organizers:
Yuliy Baryshnikov (University of Illinois at Urbana-Champaign)
Anil Hirani (University of Illinois at Urbana-Champaign)
Susan Holmes (Stanford University)

Description:
The rationale for this workshop comes from recent developments bridging discrete and continuous worlds. On one hand, we have Gromov’s work providing insight in approaching discrete metric spaces with geometric tools. On the other hand, the ideas born at the interface of topology and computer science (such as persistence) drastically improved our understanding of relations between the discrete samples from metric spaces endowed with structures, such as Riemannian manifolds, or semialgebraic sets.

Networks, a catch-all meme in computer science, engineering, and the social sciences, are understood here rather formally as discrete simplicial complexes. Implicit or explicit enrichment of their structures - considering them as topological or metric spaces - often allows one to apply instruments from geometry and analysis normally not used to analyze social, biological, or engineered networks. What are the new tools that geometry and topology provide? What is the structure of the spaces of networks? How to sample networks? These are the questions we plan to address, bearing in mind the numerous applications mentioned above.

The intended participants of the workshop are the experts in topology, geometry, and probability theory, as well as participants from statistics, computer science, biology, and engineering already working with large networks.

Speakers:
Omer Angel (University of British Columbia)  Hamid Krin (North Carolina State University)
Ginestra Bianconi (Queen Mary and Westfield College)  Dima Krioukov (Northeastern University)
Bob Bonneau (US Air Force Research Laboratory)  Michael Mahoney (Stanford University)
Victor Chepoi (Aix-Marseille Université)  Yuriy Mileyko (University of Hawaii at Manoa)
Harish Chintakunta (North Carolina State University)  Sayan Mukherjee (Duke University)
Peter Csikvari (Massachusetts Institute of Technology)  Ron Rosenthal (ETH Zürich)
Tamal Dey (The Ohio State University)  Naoki Saito (University of California, Davis)
Joel Hass (University of California, Davis)  Iraj Saniee (Lucent Technologies Bell Laboratories)
Patricia Hersh (North Carolina State University)  Blair Sullivan (North Carolina State University)
Edmond Jonckheere (University of Southern California)  Uli Wagner (IST Austria)
Matthew Kahle (The Ohio State University)  Mei Yin (Brown University)

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