

## Large Graphs: Modeling, Algorithms, and Applications

IMA Annual Thematic Program Workshop  
October 24-28, 2011

### Organizers:

**Eric D. Kolaczyk** (Mathematics and Statistics, Boston University)

**Mauro Maggioni** (Mathematics and Computer Science, Duke University)

**Michael Mahoney** (Mathematics, Stanford University)

### Description:

Large data sets emerge in a variety of applications, from signal processing to web search and recommendation engines to biological assays. In many cases, for example, the traffic on a network, gene activation in gene networks, chemical reactions in a biochemical network, and interactions among friends in a social network, these data sets, as well as their geometric structure and the way it dynamically evolves in time, may be naturally modeled as a graph.

The focus of the workshop is on the mathematical, algorithmic, and statistical questions that arise in graph-based machine learning and data analysis, as well as the corresponding algorithms and motivating applications. This workshop will be an opportunity for researchers from diverse fields to get together and share problems and techniques for handling graph structures. The connections—mathematical, computational, and practical—that arise among these seemingly diverse problems and approaches will be emphasized. In light of this, particular topics that will be emphasized will include computational techniques (randomized and online algorithms, fast simplification algorithms, etc.) that are needed when the graphs considered are very large; function approximation (e.g., using kernels on graphs) and its applications to traditional machine learning methods; graph-based topological methods for the study of the geometry of data and networks; and issues that arise with graph-based statistical modeling and associated algorithmic issues.

### Speakers:

**Edo Airoldi** (Harvard University)

**Robert Calderbank** (Duke University)

**Brian Eriksson** (Boston University and Wisconsin)

**Donald Geman** (John Hopkins University)

**Stuart Geman** (Brown University)

**Leonidas Guibas** (Stanford University)

**Matthew Harrison** (Brown University)

**Edmond Jonckheere** (University of Southern California)

**Tamara Kolda** (Sandia National Laboratories)

**Dmitri Krioukov** (University of California, San Diego)

**Mauro Maggioni** (Duke University)

**Michael Mahoney** (Stanford University)

**Milena Mihail** (Georgia Institute of Technology)

**Robert Nowak** (University of Wisconsin-Madison)

**Venkatesh Saligrama** (Boston University)

**Guillermo Sapiro** (University of Minnesota)

**Purnamrita Sarkar** (University of California, Berkeley)

**Aarti Singh** (Carnegie Mellon University)

**Blair D. Sullivan** (Oak Ridge National Laboratory)

**Neel Sundaresan** (eBay)

**Rebecca Willett** (Duke University)

[www.ima.umn.edu/2011-2012/W10.24-28.11](http://www.ima.umn.edu/2011-2012/W10.24-28.11)