

**University of Rochester**  
**Department of Electrical and Computer Engineering Colloquia**  
**Sparsity and Low Rank for Robust Social Data Analytics and Networking**

Gonzalo Mateos

Friday, March 28  
10:30 AM – 11:30AM  
CSB 209

**Abstract:** The information explosion propelled by the advent of personal computers, the Internet, and the global-scale communications has rendered statistical learning from "Big Data" increasingly important for analysis and processing. Along with data adhering to postulated models, present in large volumes of data are also those that do not -- and are referred to as outliers. In this talk, I will start with an approach to outlier-resilient principal component analysis, which establishes a neat link between the seemingly unrelated notions of sparsity and robustness to outliers, even when the signals involved are not sparse. I will argue that controlling sparsity of model residuals leads to statistical learning algorithms that are computationally affordable and universally robust. The impact of these ideas will be demonstrated in applications as diverse as identification of aberrant responses in personality assessment surveys, and unveiling communities in social networks, as well as intruders from video surveillance data. In the second part of the talk, I will switch focus towards the important task of unveiling and mapping-out network traffic anomalies given link-level traffic measurements. Leveraging the low intrinsic-dimensionality of end-to-end network flows and the sparse nature of anomalies, I will construct an estimated map of anomalies in real time to aid in monitoring the network health state. If time allows, I will finally highlight a few additional domains that include predicting network-wide path latencies, and load curve cleansing and imputation -- a critical task in green grid analytics and energy management with renewables.

**Bio:** Gonzalo Mateos was born in Montevideo, Uruguay, in 1982. He received his B.Sc. degree in Electrical Engineering from Universidad de la Republica, Uruguay, in 2005, and the M.Sc. and Ph.D. degrees in Electrical Engineering from the University of Minnesota (UofM), Twin Cities, in 2009 and 2011. From 2004 to 2006, he worked as a Systems Engineer at Asea Brown Boveri (ABB), Uruguay. Currently, he is a visiting scholar with the Computer Science Department at Carnegie Mellon University. He also holds an appointment as a post-doctoral research associate with the Department of Electrical and Computer Engineering (ECE) and the Digital Technology Center, UofM. His research interests lie in the areas of statistical learning from Big Data, network science, wireless communications, and signal processing. His current research focuses on algorithms, analysis, and application of statistical signal processing tools to dynamic network health monitoring, social, power grid, and Big Data analytics. Since 2012, he serves on the Editorial Board of the EURASIP Journal on Advances in Signal Processing. He received the Best Student Paper Award at the 13th IEEE Workshop on Signal Processing Advances in Wireless Communications, 2012 held at Cesme, Turkey, and was also a finalist of the Student Paper Contest at the 14th IEEE DSP Workshop, 2011 held at Sedona, Arizona, USA. His doctoral work has been recognized with the 2013 UofM's Best Dissertation Award (Honorable Mention) across all Physical Sciences and Engineering areas.

Light refreshments will be provided.