

**RUTGERS UNIVERSITY**  
**DEPARTMENT OF STATISTICS AND BIOSTATISTICS**  
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**Seminar**

Speaker: **Professor Waheed Bajwa**  
**Electrical and Computer Engineering**  
**Rutgers, The State University of New Jersey**

Title: **Unlocking the mystery of marginal regression for high-dimensional model selection**

Time: **3:20 – 4:20pm, Wednesday, March 5, 2014**

Place: **552 Hill Center**

**Abstract**

Linear (regression) models appear nowadays in myriad areas, such as genomics, proteomics, tumor classification, network monitoring, hyperspectral imaging, and computer tomography. One of the most fundamental of problems in linear models is that of model selection: determining a small subset of predictors (e.g., genes) that are responsible for majority of the variation in the response (e.g., the malignancy of a tumor). The focus of this talk is on model selection in high-dimensional linear models, in which the number of predictors far exceeds the number of samples of the response variable. Existing works on high-dimensional model selection either require the number of samples of the response variable to be significantly larger than the total number of predictors contributing to the response or impose restrictive statistical priors on the predictors and/or nonzero regression coefficients. In this talk, we will take a frame-theoretic approach to the problem of high-dimensional model selection and provide a comprehensive understanding of a simple algorithm, termed one-step thresholding (OST), for model selection in linear models. The OST makes use of only marginal correlations between the response and the predictors, and one of the key messages of this talk is that OST can succeed at times when methods based on convex optimization such as the lasso fail. In addition, we show that OST has the ability to perform near-optimally for a number of generic (random or deterministic) matrices as long as the design matrix satisfies conditions that are easily computable in polynomial time -- an area of great interest in applications such as genetic biomarker identification using gene expression data.

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## **Biography**

Waheed U. Bajwa received PhD degree in electrical engineering from the University of Wisconsin-Madison in 2009. He was a Postdoctoral Research Associate in the Program in Applied and Computational Mathematics at Princeton University from 2009 to 2010, and a Research Scientist in the Department of Electrical and Computer Engineering at Duke University from 2010 to 2011. He is currently an Assistant Professor in the Department of Electrical and Computer Engineering at Rutgers University. His research interests include high-dimensional inference and inverse problems, geometric methods for big data analytics, compressed sensing, statistical signal processing, wireless communications, and applications in biological sciences, complex networked systems, and radar & image processing.

Dr. Bajwa has more than 3 years of industry experience, including a summer position with GE Global Research in 2006. He received the Best in Academics Gold Medal and President's Gold Medal in Electrical Engineering from the National University of Sciences and Technology (NUST) in 2001, and the Morgridge Distinguished Graduate Fellowship from the University of Wisconsin-Madison in 2003. He was Junior NUST Student of the Year (2000), Wisconsin Union Poker Series Champion (Spring 2008), and President of the University of Wisconsin-Madison chapter of Golden Key International Honor Society (2009). He co-guest edited a special issue of Elsevier Physical Communication Journal on "Compressive Sensing in Communications" (2012), and co-chaired 1st Workshop on Signal Processing Advances in Sensor Networks (2013) and IEEE GlobalSIP 2013 Symposium on New Sensing and Statistical Inference Methods. He currently serves as an Associate Editor of the IEEE Signal Processing Letters and is a Senior Member of the IEEE.

***\*\* Refreshments will be served @2:50pm in Room 502 Hill Center \*\****