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## **Discrete Mathematics Seminar**

Time: Friday, November 9, 2018, 2:15-3:15 PM  
Room: 330 Derrick Hall  
Title: Cut Problems with Generalized Linear Constraints  
Speaker: Dr. Iván Ojeda-Ruiz, Department of Mathematics, Texas State University

### Abstract:

Several methods are used to process images in many fields, including clustering, image segmentation and medical imaging. The so-called graph-cut methods in graph theory are widely used for image segmentation. In these methods graphs determining the relation between several objects are divided into one or more pieces in order to solve a variety of problems. Most of these methods are “unsupervised”, which means there is no information known about the data objects. In some of the applications listed above some prior knowledge may be known. Using this prior knowledge can be the key to designing better methods.

A novel algorithm called the projected power method used to increase the speed of the process was published by Xu, Li, and Schuurmans in “Fast Normalized Cut with Linear Constraints” [*IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pp. 2866-2873, Jun. 2009]. We tested this algorithm and compared it to new methods that use the Krylov subspaces in a similar fashion. In this talk I will summarize the results from the new algorithms and show the solutions to generalizations of the problem.

### Bio:

Iván Ojeda-Ruiz was born in Bayamón, Puerto Rico, in 1987. He received his B.S. degree from the University of Puerto Rico, Rio Piedras Campus, in 2010, his Ph.D. degree from The University of Texas at Arlington in 2017, in Numerical Analysis.