

# **“Evaporative Cooling and Network-Based Surfing for Genetic Association Studies”**

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## **Abstract**

In this talk, I discuss a host of data-mining/machine learning approaches to detecting complex, epistatic genetic effects, including recursive partitioning (Random Forests), Recursive Elimination of Features-F (Relief), and Evaporative Cooling. Despite the power and efficiency of these approaches, one current limitation is characterizing interactive effects due to the lack of an underlying statistical model. I introduce a novel framework (SNPrank) for the characterization of network effects based on Information Theory and an adaptation of popular search engine methodology. The proposed methods are illustrated within the context of studies for genetic modifiers of smallpox vaccine antibody response as well as risk for Systemic Lupus Erythematosus. I conclude with a discussion of current limitations, specifically focusing on difficulties in creating complex, yet interpretable simulation scenarios for methods evaluation.