



THE UNIVERSITY OF CHICAGO

COMPUTATIONAL AND APPLIED MATHEMATICS STUDENT SEMINAR

**** PLEASE NOTE DIFFERENT LOCATION ****

ABBY STEVENS

Department of Statistics
University of Chicago

Graph Total Variation for Seasonal Forecasting

THURSDAY, April 25, 2019, at 1:00 PM

Jones 304, 5747 South Ellis Avenue

ABSTRACT

Standard model selection methods from statistics and machine learning are fragile in the face of dependence structures in the climate system resulting from nonstationary data with high spatiotemporal resolution. We have developed a regression scheme that explicitly accounts for spatiotemporally correlated features via a regularization approach based on an underlying graphical model. Using large ensemble climate outputs to estimate the strength of correlations among features, we form a graph with edge weights corresponding to pairwise correlations. This graph is used to define a graph total variation regularizer that promotes similar weights for highly correlated features. We apply our scheme to predict winter precipitation totals in the southwestern US using sea surface temperature (SST) over the entire Pacific basin, and we demonstrate that leveraging large ensemble climate simulations to estimate an underlying graph structure that integrates the SST dynamics provides strong predictive performance. Our results highlight the potential of integrating large ensembles output with machine learning methodologies to improve seasonal forecasting.