

Kernel Methods with Imbalanced Data and Applications to Weather Prediction

THEODORE B. TRAFALIS

*School of Industrial and Systems Engineering,
The University of Oklahoma, USA*

Abstract

The main objective of this talk is to present recent developments in the applications of kernel methods and Support Vector Machines (SVMs) to imbalanced data related to weather prediction. I will also discuss how kernel methods can be used to uncover physically meaningful, predictive patterns in weather radar data that alert to severe weather before the severe weather occurs. Specific indices related to the analysis of severe weather data (for example tornado data) using kernel methods will be also discussed. In addition a family of learning algorithms, motivated by Support Vector Machines, capable of replacing traditional methods for assimilating data and generating forecasts, without requiring the assumptions made by the assimilation methods (Kalman filters) and an application of kernel methods to processing the states of a Quasi-Geostrophic (QG) numerical model will be presented. Extensions of those techniques to other areas of applications will be investigated.