

SCMS Seminar



DATA ADAPTIVE SUPPORT VECTOR MACHINE WITH APPLICATION TO PROSTATE CANCER IMAGING

DATA

Wenqing He

Department of Statistical and Actuarial Sciences

University of Western Ontario, Canada

Lecture

Time: 15:00-16:00, Monday, Oct 8th, 2018

Venue: Room 106, Shanghai Center for Mathematical Sciences

Abstract: Support vector machines (SVM) have been widely used as classifiers in various settings including pattern recognition, texture mining and image retrieval. However, such methods are faced with newly emerging challenges such as imbalanced observations and noise data. In this talk, I will discuss the impact of noise data and imbalanced observations on SVM classification and present a new data adaptive SVM classification method.

This work is motivated by a prostate cancer imaging study conducted in London Health Science Center. A primary objective of this study is to improve prostate cancer diagnosis and thereby to guide the treatment based on statistical predictive models. The prostate imaging data, however, are quite imbalanced in that the majority voxels are cancer-free while only a very small portion of voxels are cancerous. This issue makes the available SVM classifiers typically skew to one class and thus generate invalid results. Our proposed SVM method uses a data adaptive kernel to reflect the feature of imbalanced observations; the proposed method takes into consideration of the location of support vectors in the feature space and thereby generates more accurate classification results. The performance of the proposed method is compared with existing methods using numerical studies.