

Support Vector Machine with Graphical Network Structures in Features

Wenqing He

*University of Western Ontario
E-mail: whe@stats.uwo.ca*

Abstract: Machine learning techniques, regardless of being supervised or unsupervised, have attracted extensive research attention in handling data classification. Typically, among supervised machine learning algorithms, Support Vector Machine (SVM) and its extensions have been widely used in various areas due to their great prediction capability. These learning algorithms basically treat features of the instances independently when using them to do classification. However, in applications, features are commonly correlated with complex network structures. Ignoring such a characteristic and naively implementing the SVM algorithm may yield erroneous classification results. To address the limitation of the SVM algorithm, we propose new learning algorithms which accommodate network structures in the features of the instances. Our algorithms capitalize on graphical model theory and make use of the available R software package for SVM. The implementation of the proposed learning algorithms is computationally straightforward. We apply the new algorithms to analyze the data arising from a gene expression study.