Announcing the Final Examination of Alaleh Razmjoo for the degree of Doctor of Philosophy

Time & Location: June 6, 2018 at 10:00 AM in Engineering II 312
Title: METHODS FOR ONLINE FEATURE SELECTION FOR CLASSIFICATION PROBLEMS

Online learning is a growing branch of data mining which allows all traditional data mining techniques to be applied on an online stream of data in real-time. In this proposal, we present three efficient algorithms for feature ranking in online classification problems. Each of the methods are tailored to work well with different types of classification tasks and have different advantages. The reason for this variety of algorithms is that like other data mining solutions, there is usually no algorithm which works well for all types of data mining tasks. The first method, is an online sensitivity based feature ranking (SFR) which is updated incrementally, and is designed for classification tasks with continuous features. We take advantage of the concept of global sensitivity and rank features based on their impact on the outcome of the classification model. In the feature selection part, we use a two-stage filtering method in order to first eliminate highly correlated and redundant features and then eliminate irrelevant features in the second stage. One important advantage of our algorithm is its generality, which means the method works for correlated feature spaces without preprocessing. It can be implemented along with any single-pass online classification method with separating hyperplane such as SVMs. In the second method, with help of probability theory we propose an algorithm which measures the importance of the features by observing the changes in label prediction in case of feature substitution. At last, we present a class-based feature importance ranking method which evaluates the importance of each feature for each class, this sub-rankings are further exploited to train an ensemble of classifiers. The proposed methods will be thoroughly tested using benchmark datasets and the results will be presented in the last chapter.

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Approved for distribution by Qipeng Zheng, Committee Chair, on May 23, 2018.

The public is welcome to attend.