



EXTERNAL VS. INTERNAL SVM-RFE: THE SVM-RFE METHOD REVISITED AND APPLIED TO EMOTION RECOGNITION

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Abstract: Support Vector Machines (SVM) are well known as a kernel based method mostly applied to classification. SVM-Recursive Feature Elimination (SVM-RFE) is a variable ranking and selection method dedicated to the design of SVM based classifiers. In this paper, we propose to revisit the SVM-RFE method. We study two implementations of this feature selection method that we call *External SVM-RFE* and *Internal SVM-RFE*, respectively. The two implementations are applied to rank and select acoustic features extracted from speech to design optimized linear SVM classifiers that recognize speaker emotions. To show the efficiency of the *External* and *Internal SVM-RFE* methods, an extensive experimental study is presented. The SVM classifiers were selected using a validation procedure that ensures strict speaker independence. The results are discussed and compared with those achieved when the features are ranked using the Gram-Schmidt procedure. Overall, the results achieve a recognition rate that exceeds 90%.

Key words: *Feature selection, classification, Support Vector Machines (SVM), emotion recognition*

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1. Introduction

Feature selection is a fundamental issue when dealing with data separation. On one hand, the candidate features must form a large set in order to be enough informative and selective to separate the data. On the other hand, only the most relevant of them have to be involved in the design of the classifier. Irrelevant features can be considered as noisy data and may deteriorate the classification accuracy. Thus, they must be discarded. Usually, the feature selection process consists in determining the subset of variables that achieves the best classification

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