Pattern Classifiers Based on Support Vector Machines

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Abstract
Support Vector Machines (SVMs) are a set of related supervised and unsupervised learning methods, applicable to both classification and regression. SVMs may be defined as a classification method that determines the maximum-margin hyperplane which divides the classes. In the case of basic linear classification, a SVM creates a maximum margin hyperplane that lies in a transformed input space. Given binary choice training examples (labeled either 'yes' or 'no'), a maximum-margin hyperplane divides the 'yes' and 'no' examples, such that the distance from the closest examples, i.e. the margin, to the hyperplane is maximized. In non-linear case we have non-separable data and the SVM is therefore a combination of a maximum margin and a penalty for misclassification.

The essence of SVM is that the input data is mapped to a higher-dimensional feature space, by the use of the kernel trick, where the data can be separated, or "shattered", by a hyperplane. Finding such an optimal separating hyperplane requires solving a quadratic programming problem.

The goal of this research is to use some of the existing software implementations for conducting experiments by using SVMs technique and to extent the functionality of these existing packages by including additional kernels beyond traditional one. Our experiments demonstrated that the fitting ability of the kernel depends greatly on the characteristics of the input. This means that choosing one kernel and expecting it to be the best for all applications is rather naïve. Parameter selection is also an issue solving of which determines the classifier performance.