

The equivalent analysis between the convex hull and the support vector machine

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ABSTRACT

The support vector machine (SVM) is a kind of machine learning algorithms based on the Statistical Learning Theory. The SVM is designed to construct decision function (or separating hyperplane) between two classes of sample points, such that the margin between the hyperplane and the points closest to it becomes maximal. Currently, the SVM can apply the Sequential Minimal Optimization algorithms to break a large scale constrained quadratic programming (QP) problem into a series of small possible QP problems. As a result, the SVM may still require many passes through the dataset to reach a reasonable solution. Furthermore, the construction of the SVM model may require complex mathematics and optimization process. Therefore, we present a geometric analysis to describe the problems of linear separable sample data. The concept of convex hull is utilized for the given data and the problem of finding the optimal hyperplane is converted to the nearest point problem. The simulation results demonstrate that the obtained decision functions are almost the same as the solutions from the SVM.

Keywords : support vector machine、geometric analysis、convex hull

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