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无偏置v-SVM分类优化问题研究

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Study on v-SVM for Classification Optimization Problem without Bias

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摘要 在高维空间中，分类超平面倾向于通过原点，即不需要偏置(b)。为了研究在v-SVM分类问题中是否需要b，该文提出了无(b)的v-SVM的对偶优化问题并给出了其优化问题求解方法。该方法通过有效集策略将对偶优化问题转化为等式约束子优化问题，然后通过拉格朗日乘子法将子优化问题转化为线程方程组来求解。实验表明偏置(b)的存在会降低v-SVM的泛化性能，v-SVM只能得到无(b) v-SVM的次优解。

关键词： v-支持向量机 偏置 泛化性能 有效集

Abstract： In the high-dimensional space, the classification hyperplane tends to pass through the origin and bias (b) is not need. To study whether v-SVM for classification needs (b), dual optimization formulation of v-SVM without (b) is proposed and the corresponding method of solving the optimization formulation is presented. The dual optimization formulation is transformed into equality constraint sub-optimization formulation by the active set strategy in this method, then the sub-optimization formulation is transformed into the linear equation by lagrange multiplier method. The experimental results show that the existence of (b) would reduce the generalization ability of v-SVM and v-SVM can only obtain the sub-optimal solution of v-SVM without b.

Keywords： v-Support Vector Machine (SVM) Bias Generalization ability Active set

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