

基于戴帽 L1 范数的双支持向量机

沈 洋, 戴月明

(江南大学 物联网工程学院, 江苏 无锡 214122)

摘 要: 针对双支持向量机模型易受异常点影响导致泛化性能较低的问题, 提出了一种基于戴帽 L1 范数的双支持向量机模型. 采用带有上限值的戴帽 L1 范数代替 L2 范数来构造最优化问题, 一定程度上削弱了离群点、噪音点对于两个超平面构造的影响, 增强了模型的鲁棒性. 另外, 针对构造的新的双支持向量机模型最优化问题提出了一个简单有效的迭代算法并且在理论上证明了该算法的收敛性. 在无噪以及有噪 UCI 数据集上的实验结果表明, 与其它支持向量机模型相比, 该模型有着更强的鲁棒性以及稳定性.

关键词: 双支持向量机; L1 范数; L2 范数; 戴帽 L1 范数; 损失函数

Twin support vector machine based on capped L1-norm

SHEN Yang, DAI Yue-ming

(School of Internet of Things Engineering, Jiangnan University, Wuxi 214122, China)

Abstract: In view of the low generalization performance of twin support vector machine model which is easily affected by outliers, a new twin support vector machine model based on capped L1-norm is proposed in this paper. The capped L1-norm with upper bound value is used to construct the optimization problem instead of L2-norm, which weakens the influence of outliers and noise points on the construction of two hyperplanes to a certain extent and enhances the robustness of the model. In addition, a simple and efficient iterative algorithm is proposed for the construction of a new twin support vector machine model optimization problem, and the convergence of the algorithm is proved theoretically. Experimental results on noiseless and noisy UCI data sets show that the proposed model is more robust and stable than other SVM models.

Key words: twin support vector machine; L1-norm; L2-norm; capped L1-norm; loss function

作者简介:

沈 洋 男, (1994-), 硕士研究生. 研究方向为人工智能、机器学习. E-mail: 1825472824@qq.com.

戴月明 男, (1964-), 硕士, 副教授. 研究方向为人工智能、软件工程.