

论文与报告

一种新的构造SVM分类器的几何最近点法

刘振丙, 陈忠, 刘建国

1. 华中科技大学图像识别与人工智能研究所多谱信息处理技术国家重点实验室 武汉 430074

收稿日期 2009-4-20 修回日期 2009-6-24 网络版发布日期 接受日期

摘要

引入了尺度化凸壳(Scaled convex hull, SCH)的概念, 证明了与之相关的性质, 通过这些性质可以把求解线性不可分支持向量机(Support vector machine, SVM)的问题转化为计算两类训练样本分别生成的尺度化凸壳间的最近点对的问题. 然后用几何最近点法计算尺度化凸壳间的最近点对, 把垂直平分连接最近点对线段的超平面作为线性不可分问题的分类超平面. 此外, 还把这种方法推广到非线性情形, 并给出了解决非线性问题的一种简化算法. 理论分析和实验均表明, 与已有的方法相比, 尺度化凸壳法在取得相同分类成功率的同时, 训练时间大大减少, 特别适用于样本较多的大规模分类问题.

关键词 [最大间隔](#) [尺度化凸壳](#) [最近点对](#) [Mitchell-Dem'yanov-Malozemov \(MDM\)算法](#)

分类号

A Novel Geometric Nearest Point Algorithm for Constructing SVM Classifiers

LIU Zhen-Bing, CHEN Zhong, LIU Jian-Guo

1. National Key Laboratory of Science and Technology on Multi-spectral Information Processing, Institute for Pattern Recognition and Artificial Intelligence, Huazhong University of Science and Technology, Wuhan 430074

Abstract

In this paper, the notion of "scaled convex hull (SCH)" is employed and a set of theoretical results are exploited to support it, through which the nonseparable support vector machine (SVM) classification problems can be transformed to the problems of computing the pair of nearest points between SCHs. As a practical application of the SCH framework, a popular nearest point algorithm has been adopted to find the pair of nearest points between SCHs (each is generated by training patterns of each class), and the separating hyperplane bisects, and is normal to the line segment joining these two nearest points. Then, the proposed method is generalised to solve nonlinear problems and a simplified version for the nonlinear case is presented. The theoretical analysis and experiments show that the proposed method may achieve better performance than the state-of-the-art methods in terms of the kernel evaluations and execution time, making it suitable for large scale classification.

Key words [Maximal margin](#) [scaled convex hull \(SCH\)](#) [the pair of nearest points](#) [Mitchell-Dem'yanov-Malozemov \(MDM\) algorithm](#)

DOI: 10.3724/SP.J.1004.2010.00791

通讯作者 刘振丙 zbliuhust@gmail.com

作者个人主页 刘振丙; 陈忠; 刘建国

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF \(771KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献\[PDF\]](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

相关信息

▶ [本刊中 包含“最大间隔”的 相关文章](#)

▶ 本文作者相关文章

· [刘振丙](#)

· [陈忠](#)

· [刘建国](#)