[2009-0303] 一种新的构造SVM分类器的几何最近点法

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摘要
引入了尺度不变凸壳的概念，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SVM的问题转化为计算两类训练样本分别生成的尺度不变凸壳间的最近点对的问题.
然后可以用几何最近点法计算尺度不变凸壳间的最近点对,
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，与已有的方法比，
尺度不变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　尺度不变凸壳　最近点对　MDM算法
分类号

[2009-0303] A Novel Geometric Nearest Point Algorithm for Constructing SVM Classifiers

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Abstract
In this paper, the notion of ``scaled convex hulls''(SCH) is employed and a set of theoretical
results are exploited to support it, through which the nonseparable
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 applied to find the
pair of nearest points between SCHs (each is generated by training
patterns of each class), and the separating hyperplane a) bisects,
and b) is normal to the line segment joining these two nearest
points. Then, the proposed method is generalied to solve nonlinear problems and a
simplied 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 hulls　the pair of nearest points　MDM algorithm

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