SVM

基本概念

- 一种监督式学习的方法
- 支持向量机构造一个超平面或者多个超平面,这些超平面可能是高维的,甚至可能是无限多维的。在分类任务中,它的原理是,将决策面(超平面)放置在这样的一个位置,两类中接近这个位置的点距离的都最远。

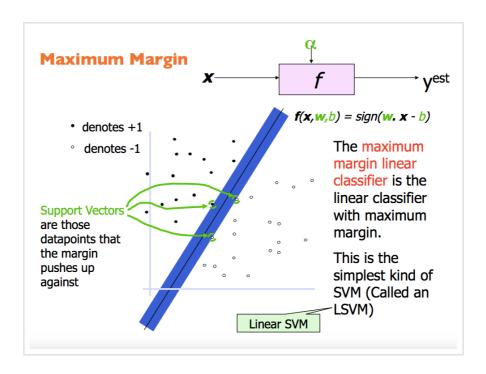
核心思想

- Use kernel function to transform low dimensional training samples to higher dim (for linear separability problem)
- Use quadratic programming (QP) to find the best classifier boundary hyperplane (for global optima)

分类

- 线性可分支持向量机
- 线性支持向量机
- 非线性支持向量机

线性可分支持向量机

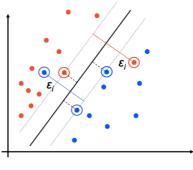


线性支持向量机

例图

Soft Margin Classification

- What if the training set is not linearly separable?
- Slack variables ε_i can be added to allow misclassification of difficult or noisy examples, resulting so-called soft margin.



Hinge loss

Hinge loss

■ The soft margin SVM is equivalent to applying a hinge loss

$$L(w,b) := \sum_{i=1}^{n} \max(1 - y_i(w^T x_i + b), 0)$$

Equivalent unconstrained optimization formulation

$$\min_{\{\mathbf{w},b\}} L(\mathbf{w},b) + \lambda ||\mathbf{w}||^2 \qquad \lambda = 0.5/C$$

$$- \text{ Hinge Loss}$$

$$- 0-1 \text{ Loss}$$

$$y.(w.x+b)$$

$$0 \qquad 1 \qquad 2$$

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参考资料

• 龙星计划课程lecture 4-5

8/7/12

- July
- Wiki
- libsvm代码注释