

Support Vector Classifier

... is a relaxation of the maximal margin classifier.

It allows for a number of points to land on the wrong side of the margin or even the hyperplane.

This is accomplished by introducing the slack ϵ_i for each point i in the training data set subject to the total budget C .

Optimization Problem.

$$\max_{\beta_0, \beta, \epsilon} M \quad \text{subject to} \quad \sum_{j=1}^p \beta_j^2 = 1$$

and

$$y_i(\beta_0 + \beta_1 x_{i1} + \dots + \beta_p x_{ip}) \geq M(1 - \epsilon_i) \quad \text{for all } i=1..n$$

$$\text{w/ } \epsilon_i \geq 0 \quad \text{for all } i$$

$$\text{and } \sum_{i=1}^n \epsilon_i \leq C$$