Lab #5 : Support Vector Machine (SVM)

Out : April. 27th, 2011

Due : May. 8th, 2011 (23:59)

Programming homework

In this homework, you will implement two different approaches that learn a binary linear discriminant. First, you will implement Support Vector Machine (SVM) algorithm using linear kernel (in this homework, you consider the linear kernel case only, and you do not have to consider the non-separable cases). Second, you will implement a parametric classification method. In the method, you can assume two normal distributions for each class with a shared diagonal covariance matrix.

(You can assume that the classes of the data are linearly separable)

(1) Implement the function of **svm()**. It should return the parameters w0 and **w** using quadratic programming. _Visualize_ your decision boundary overlapped with your dataset. You also need to indicate the support vectors.

(2) Implement the function of **twonorm()**. It should return the parameters w0 and **w** using parametric classification method. _Visualize_ your decision boundary overlapped with your dataset.

Ex)   Visualization examples of **svm()** and **twonorm()**
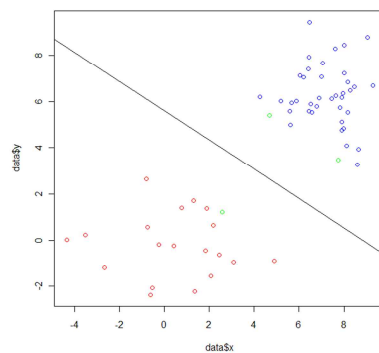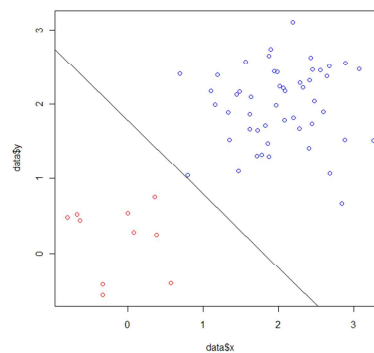
svm()   twonorm()

*Hint: Use a quadratic programming function (solve.QP) provided by the "quadprog" package. You can download and install it from CRAN. You may face the problem that the matrix is not positive definite when you use solve.QP function. In such a case, you can use make.positive.definite function in the "corpcor" package, which can also be downloaded from CRAN.

Submission format

Please submit the **[#ID]_[FIRSTNAME]_[LASTNAME]_lab5.[zip or R]** file that contains the source code for the programming homework.