

Homework 3 (Computer Assignment)

Ho-Kashyap Procedure

- (a) Given the following set of prototypes

$$S_1: (0,0), (0,1)$$

$$S_2: (1,0), (1,1)$$

Work in augmented space. Apply Ho-Kashyap (with pseudoinverse) procedure until it converges to a solution vector or until it tells you that there is no solution. Start with $\underline{b}(1)=(1,1,1,1)^T$ and use $\alpha=1$

- (b) Does the resulting weight vector classify all prototypes correctly?

- (c) & (d) Do same as (a) and (b) except you are given instead the following sets of prototypes:

$$S_1: (0,0), (1,1)$$

$$S_2: (0,1), (1,0)$$

SVM

Given the following training data (i.e., prototypes) from two categories,

$$S_1: (1,1), (2,2), (2,0)$$

$$S_2: (0,0), (1,0), (0,1)$$

- (a) Apply Support Vector Machine and find the weight vector and linear decision boundary for the optimal hyperplane. Plot the prototypes and decision boundary.

Use `svmtrain` in Matlab.

- (b) Write down the decision boundary in a mathematical form. What is the optimal margin? (Compute the optimal margin). Find the support vectors and mark them in the plot
- (c) [extra] You might want to try different kernel options for `svmtrain`.