

Name:

Student ID#:

Statistical Pattern Recognition (CE-725)
Department of Computer Engineering
Quiz #8 Solution (SVM Basics) - Spring 2011

What are the values for the λ_i and the offset b that would give the maximal margin linear classifier for the two data points $(x_1, y_1) = (0, 1)$ and $(x_2, y_2) = (4, -1)$?

You should be able to find the answer without deriving it from the dual Lagrangian.

Sol:

We know that the $w = \sum \lambda_i x_i y_i$, Thus:

$$W = \lambda_1 x_1 y_1 + \lambda_2 x_2 y_2 = \lambda_1 (0)(1) + \lambda_2 (4)(-1) = -4\lambda_2$$

We know further that $\sum y_i \lambda_i = 0$, so $\lambda_1 = \lambda_2$

Lastly, we know that the margin for the support vectors is 1, so

$$\begin{aligned} wx_1 + b &= 1 \\ wx_2 + b &= -1 \end{aligned}$$

Then,

$$b=1, w=-0.5, \lambda_1=\lambda_2=1/8.$$