

Recitation 9: Practice Exercises for Support Vector Machines

LOrtiz (Orig. by KKoile)

Part 1: Using the SVM demonstration program

Note: You can access the SVM demonstration program from the 6.034 web page.

1. How does changing the kernel function affect each of the test cases?
2. Does changing the kernel change the location of a decision boundary?
3. How does the distance between positive and negative data points affect the width of the street and the support vector weights?
4. What would a diagram look like for a support vector machine that has overfit the data?
5. How can you tell by comparing diagrams which kernel does the best job at building a classifier for a particular set of data?

Part 2: Thinking about the math

1. What equations are used for classification in a support vector machine?
2. Use the fact that a line can be represented using a normal vector and a distance from the origin to explain how the above equation classifies points on either side of a line.
3. When describing the placement of decision boundaries using a support vector machine, what function are we maximizing in our LaGrangian formulation of the problem? What do our constraints represent?
4. Dot products are used inside the classifier of a support vector machine. Are they used in the training step as well? If so, where?
5. The best decision boundary yields the widest street. To maximize the width of the street, we end up maximizing an equation written in terms of what variables?
6. Once we have found support vectors and their weights, how do we find a classification vector (which we have called w)?