Machine Learning - CSCI 5622

HW 3 - SVM

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Analysis

1. Sklearn implementation of support vector machines to train a classifier to distinguish 3's from 8's,

   `sv.fit(data.x_train, data.y_train)`

   The Accuracy is **0.969**

   The Confusion Matrix is

	3	8
3	996	34
8	29	280

2. Performance of SVM for various values of C using linear, rbf kernels

C	Kernel	Accuracy
0.01	linear	0.968612064738
0.1	linear	0.97106424718
1	linear	0.968121628249
2	linear	0.966159882295
5	linear	0.96468857283
10	linear	0.963707699853
100	linear	0.95831289848

C	Kernel	Accuracy
0.01	rbf	0.917606669936
0.1	rbf	0.954389406572
1	rbf	0.969102501226
2	rbf	0.972535556645
5	rbf	0.978911230996
10	rbf	0.981363413438
100	rbf	0.989700833742

   From the above table, we can see that when using linear kernel, which is similar to a svm without the kernel trick, as you increase the value of C above 0.1 you start penalizing more for misclassification and try to fit more data to its correct class, so when the data isn't linearly separable the accuracy decreases. In case of rbf kernel, as the data is projected to a higher dimension, the data may become more separable and as you increase the value C you try to predict more values correctly and accuracy increases.

3. Examples of support vectors from each class when using a linear kernel.