Computer Science 145, Homework 6

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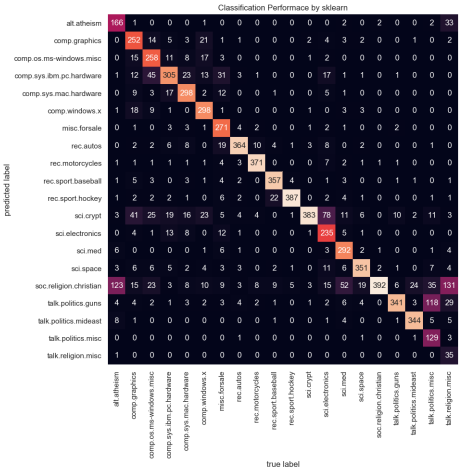
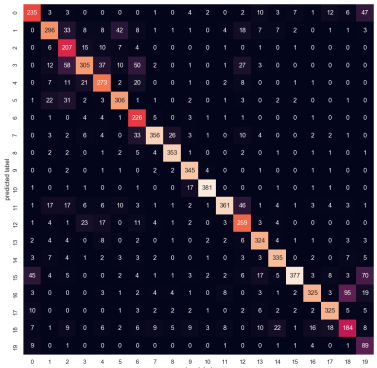
Problem 1

a) The classification accuracy for both implementations as well as the classification matrices are shown below.

	Train Set Accuracy	Test Set Accuracy
sklearn implementation	0.9326498143892522	0.7738980350504514
my implementation	0.941077291685154	0.7810792804796802





b) Naive Bayes is a generative model. This is because it learns the actual probability distribution of words in different document classes. It does not simply learn a decision boundary between the classes. Naive Bayes is different from logistic regression because logistic regression can only separate data. Meanwhile, Naive Bayes can generate data from the model it learns. A pro of Naive Bayes is that it is simple to understand and train. Drawbacks include that it makes a very strong assumption that our document is a bag of words that are independent of each other, and that it will not work very well when our data is imbalanced. If a class in the training data does not contain a word, our classifier would incorrectly classify any document of the class that does contain that word. This is solved with smoothing.

Problem 2

a)

b)

c)