01_svm_attempt

April 9, 2019

1 SVM Analysis

This notebook will analyze my attempt at making an SVM. Due to the large data size, the data is first clustered using the MiniBatchKmeans (see load.py and svm.py). This way, the SVM can be computed in a reasonable time.

```
In [1]: %load_ext autoreload
        %autoreload 2
        %matplotlib inline

        import numpy as np
        import sklearn #SciKit-learn, good ML package
        from sklearn.externals import joblib #for dumping and loading learned classifiers
        from sklearn import tree as sktree
        import os
        import time
        import matplotlib.pyplot as plt

        from load import DataWorker #custom class for working with the data worker

        cwd = os.getcwd()
        ld = DataWorker() #load the data into the class
        print("Size of training set: %d" % ld.n_training)
        print("Number of input dimensions: %d" % ld.n_inputs)
        print("Size of test set: %d" % ld.n_tests)
```

```
Size of training set: 200000
Number of input dimensions: 200
Size of test set: 200000
```

1.1 Cross Validation Scores

First, let's compute the CV score for 4 different kernels, tuning the C parameters. This parameters governs the degree to which the SVM algorithm allows for misclassification. C=1 means less misclassification.

Conclusions: Well, this ended poorly. It appears the CV scores are awful, and return only zeroes. This is unfortunate as this means the SVM method is likely not going to be computationally feasible given my resources. Moving on for now.

```
In [7]: work_dir = "%s/simple_svm" % cwd
        kernels = ["linear", "poly", "rbf", "sigmoid"] #tried these four kernels
```

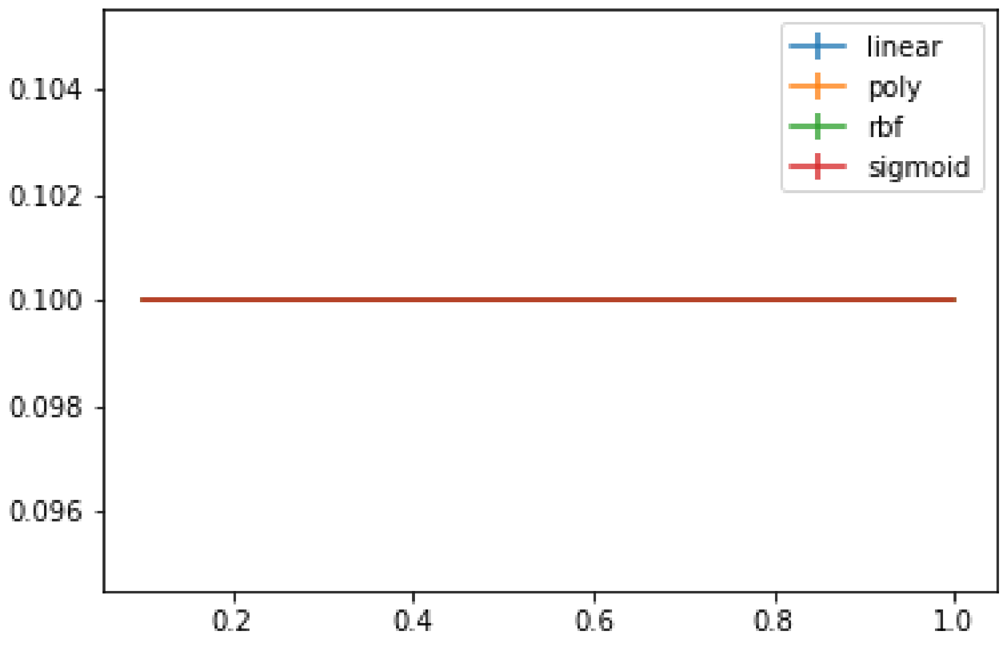
```
In [15]: # load and compute averages and standard deviation for each kernel's CV score
         all_cvalues = []
         all_cv_avgs = []
         all_cv_sd = []

         for i_kern in kernels:
             all_cvalues.append(np.loadtxt("%s/cv_%s_values.dat" % (work_dir, i_kern)))
             cv_scores = np.loadtxt("%s/cv_%s_scores.dat" % (work_dir, i_kern))
             all_cv_avgs.append(cv_scores.mean(axis=1)) #I can't believe it took me 4 years to
             all_cv_sd.append(cv_scores.std(axis=1))
```

```
In [19]: # plot the results
         plt.figure()
         for i in range(4):
             plt.errorbar(all_cvalues[i], all_cv_avgs[i], all_cv_sd[i], label=kernels[i])

         plt.legend()
```

```
Out[19]: <matplotlib.legend.Legend at 0x81dbf96c>
```



```
In [ ]:
```