Machine Learning (Math 9880) Project

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1 Introduction

In this project, we are trying to classify the images of cats and dogs using the Kaggle cats and dogs dataset from the https://www.microsoft.com/en-us/download/details.aspx?id=54765. In the next section we describe the method which we have adopted in order to classify the images . The code for our experiments in the last section is written in MATLAB. Our experiments show the increase in the accuracy of classifier as the number of training objects increases.

2 The Method/Code

In order to run the code in MATLAB, we need to have the Compute Vision Toolbox and the Statistics and Machine Learning Toolbox installed. We train the image classifier by "trainImageCategoryClassifier(trainingset, bag)" which returns an image category classifier. The classifier contains the number of categories and the category labels for the input images. The function trains a support vector machine (SVM) multiclass classifier using the input bag, a bagOfFeatures object. The bagOfFeatures(triningset) returns a bag of features object which is generated using the sammples from the trainingset. Tthe visual vocabulary is created from Speeded-Up Robust Features (SURF) features extracted from images in "trainingset".

3 Experiments

We submitted three experiments, one in our PC and the other two in Palmetto, the first one using 0.001 of the data which included approximately 25 images of cats and dogs for training the classifier , the second one in Palmetto using 0.10 of the data, including about 2500 images of cats and dogs, and the third one using 0.30 of the data which approximately tested 7500 images of cats and dogs. For the first experiment that we ran in PC, the approximate time was about one minute and each time we got a bit different Accuracy 0.67, 0.54.

The confusion matrix for each test is as follows:

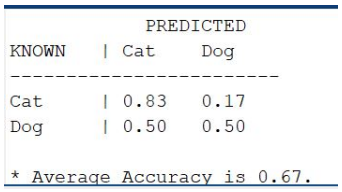

Figure 1: The First experiment in PC

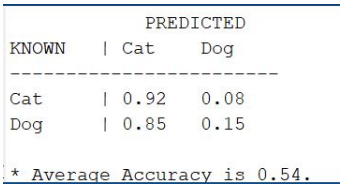

Figure 2: The Second experiment in PC

Then, we did the experiment using 0.10 for training and test of the data in Palmetto. the approximate time for running the code and getting the result was around 90 minutes. The average accuracy for this test was 0.76 and the confusion matrix is shown in Figure 4.

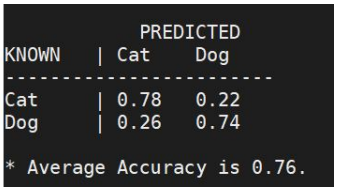

Figure 3: The Third experiment in Palmetto

Then, we went forward and used 0.3 of the data for training and test. This time it took around 10 hours to receive the result. The Average Accuracy reported 0.75 and the configuration matrix is shown in the figure 5 as follows:

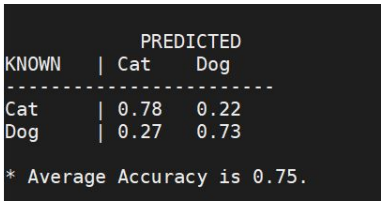

Figure 4: The Fourth experiment in Palmetto