Computer Vision Assignment 3 Report

Note: We were not able to upload Overfeat folder into github for part3 as github does not accept folder with more than 100 file.

Before executing please place the Overfeat folder in the directory of a3.cpp file.

The folder structure should be as follow,

"overfeat/bin/linux_64/overfeat"

While running SVM, if permission denied error raises please execute following command,

chmod +x ./svm_light1/svm_multiclass/svm_multiclass_learn

chmod +x ./svm_light1/svm_multiclass/svm_multiclass_classify

PART 1

The SVM takes lesser time to execute on the grayscale image because of reduced features and more time for the colored features.

As we get the same amount of accuracy for both of them, we can use the grayscale image to make it time efficient.

Qualitatively, the RGB image should give better accuracy as it contains more features but the accuracy obtained with the grayscale is the same with much lesser number of features.

	size	Accuracy
Grayscale image	30X30 (900-d)	20%
RGB	30X30 (2700-d)	20%
grayscale	20X20 (400-d)	12%
RGB	20X20 (1200-d)	12%
RGB	25X25 (1875-d)	18%

PART 2.1

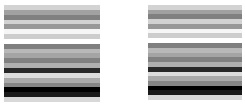
PCA SVM

Eigen value and eigen vector are calculated by symmetric_eigen() function c_img library.

Quantitative and Qualitative analysis are given below,

K feature	Subsampling value	Accuracy
100	30 25 20	7.6 6.3 5

The sample images of top eigen vector are:



The eigen values a were decreasing from 6000 to 50 in first 100 and after that the eigen values are almost constant with a difference in decimal.

PART 2.2

HAR-LIKE FEATURES:

To construct Haar-like features for the images, we have used windows detecting edges, lines of different sizes. We have used integral images to speed up the computation.

The accuracy for HAR-like features was 7%.

BAG OF VISUAL WORDS:

We have implemented kmeans to form k clusters and determined centroid of the clusters. Vocabulary is constructed with all the calculated centroids and histograms are calculated for the images. Vocabulary is written to vocabulary.txt file while training, to use the same visual words during testing phase.

Accuracy is obtained by executing for different k's as follows:

k	**Accuracy**
30	7.6
40	10
50	17
60	14
75	16

The accuracy we attained in bag of visual words the accuracy is 17%.

PART 3 Deep Learning

With deep learning features we have obtained an accuracy of 76% with the tradeoff parameter of margin and error (c) of SVM classifier set to 100.

Based on the analysis of the algorithm with respect to accuracy deep learning features seems to more accurate compared to others.