

# Assignment

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## 1 Introduction

The report is in reference to the computer vision assignment. I have completed the task using both supervised and unsupervised techniques.

## 2 Data Loading

I implemented a reusable function to read images data from the folders and putting them in the corresponding training and testing arrays. Also, prepared label arrays for both training and testing data. Converted the simple arrays to numpy arrays so that we can get benefits of awesome numpy arrays built-in functions. I used opencv to read images from the file system and resized the images to a standard size of 64 x 64.

## 3 Feature Extraction

Extracted the features from the images using Hog image feature extractor. It gives us a fixed size vector for all images i.e. 512 length vector

## 4 Supervised Learning

I have used the Random forest for the classification of images. There are different advantages of using Random forest. First, every tree training in the sample uses random subsets from the initial training samples. Secondly, the optimal split is chosen from the unpruned tree nodes' randomly selected features. Thirdly, every tree grows without limits and should not be pruned whatsoever.

## 4.1 Results

We have got very good scores, accuracy of more than 99% on train data and 100% on test data. Below is the classification report

	precision	recall	f1-score	support
1	1.00	1.00	1.00	20
2	1.00	1.00	1.00	20
3	0.95	1.00	0.97	19
4	1.00	1.00	1.00	20
5	1.00	1.00	1.00	20
6	1.00	1.00	1.00	20
7	1.00	0.95	0.98	21
8	1.00	1.00	1.00	20
9	1.00	1.00	1.00	20
10	1.00	1.00	1.00	20
accuracy			0.99	200
macro avg	0.99	1.00	0.99	200
weighted avg	1.00	0.99	1.00	200

## 5 Unsupervised Learning

I have used the Kmeans clustering for the clustering of related images.

### 5.1 Results

I implemented my own function to compute the accuracy of images being in the right cluster. And we have an accuracy of 85%.

## 6 Code Repository

Please find the assignment code at link: <https://github.com/hamza-arshad/cv-image-classification>