## □ Implementation:

I implemented homework-3 tasks in MATLAB. I used MATLAB R2015a to write and run the code, and to get the final results.

## □ Dataset:

In dataset, we have 40 subjects and 10 face images per subject. So, in total, we have 40*10 = 400 face images from 40 subjects. For each of the tasks, I applied 5-fold Cross Validation on this dataset.

## □ Experimental Results:

Below are the short descriptions and final accuracies of each of the tasks of this homework:

**Task-1:** At first, PCA has been used to reduce the dimensionality of the images. For PCA, I used k=30. Then, I applied 1NN algorithm (KNN with K=1) for classification. The final accuracy that I got using 5-fold Cross Validation is **97.25%**.

**Task-2:** At first, I resized image to 56x46 pixels. Then, I did the exactly same things as task-1. The final accuracy of task-2 is **97%.**

**Task-3:** I applied LDA for reducing image dimensionality to 30. Then, I applied 1NN algorithm. After using 5-fold Cross Validation, final accuracy is **56.75%**.

**Task-4:** At first, I used PCA to reduce the image dimensionality to the number of training data, which is 320. Then, I applied LDA to further reduce the image dimensionality to 30. In this task, after applying 5-fold Cross Validation the final accuracy is **24.25%**.

**Task-5:** For classification, I used Kernel SVM in this task. Here, I implemented and used "Polynomial kernel with degree 2". After applying 5-fold cross validation, the accuracy is **95.75%**.

**Task-6:** At first, I used PCA to reduce the image dimensionality to 30. Then, I did exactly the same things as task-5. Here, I got **49.25%** accuracy.

As an experiment, I repeated task-1 (KNN with k=1) but did not apply PCA to reduce dimensions, and the accuracy was **95.75%**. Coincidently, Kernel SVM from task-5 also gave the same accuracy. Therefore, in this experiment, 1NN (KNN with k=1) and Kernel SVM (polynomial kernel with degree 2) showed similar sensitivity to the high dimensionality of data.

## □ How to run the code:

“codes” folder contains both of the codes and data. To get the final results, please run **Main.m** file in MATLAB R2015a. Please note that, MATLAB version should be exactly the same to get above mentioned accuracies.