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**Pattern Recognition Project**

Step 1: Reading Images.

In this step we added the path for the images as variable “path” and created a for loop to change the path constantly to get into each folder and upload each image in order and append them to our lists.

Step 2: Train Test Split.

We created a for loop to go over every image of every person in our data, adding every odd image to training and even to testing (50% split).

Step 2.5: Alternate TTS.

We created a for loop to go over every image of every person in our data. having a counter that starts at 1 every 10 iterations, we add the first 3 images of said iterations to testing and the other 7 to training (70% split).

Step 3: Using PCA To Reduce Data Dimensions.

**Step 3.1:** Calculating the centralized data by subtracting the mean of the data from the data.

**Step 3.2:** Calculating the covariance matrix by multiplying the centralized data with it’s transpose and dividing by the size of the data.

**Step 3.3: Calculating the eigen vectors by using “calculate\_covariance\_matrix” function to obtain the covariance and then getting the eigen values and vector from it using the “np.linalg.eigh” function and sorting them.**

**Step 3.3:** We finally choose the reduced dimensions by getting “I”, which is the index of the eigen value where the sum of all eigen values up to it is more than or equal to the alpha. “I” is then used to choose the reduced eigen vectors.

Step 4: The Classifier.

Step 5:KNN And Tuning Of Alpha.