

MINI-PROJECT-1

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Face recognition using PCA

Why do we use PCA?

Given the training data increasing with no. of classes increasing we will be working on large amount of data for classifying an image.

Which is more complex to work with and not an optimal method to work on. So we need to reduce the data we work with and this should be done without much loss of data. So we use PCA for reducing the dimensions of given data. The main idea is to find the relation between the dimensions of images. PCA is just representing the given data in lesser no. Of dimensions.

How do we do it?

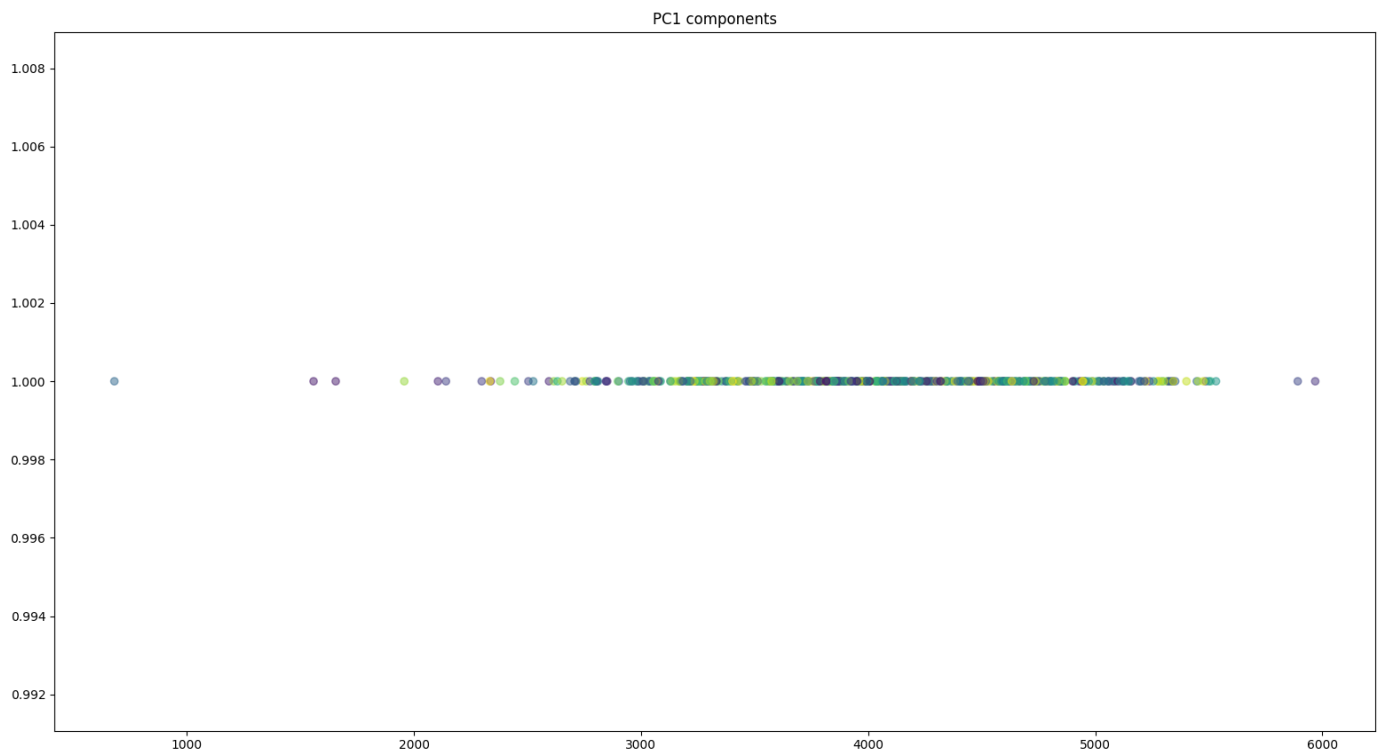
Initially, we find the eigenvectors and corresponding eigen values of the covariance matrix of given data by converting data in (32×32) .

Now we sort the eigen vectors according to decreasing order of eigen values and we get the principal components with decreasing of importance of them.

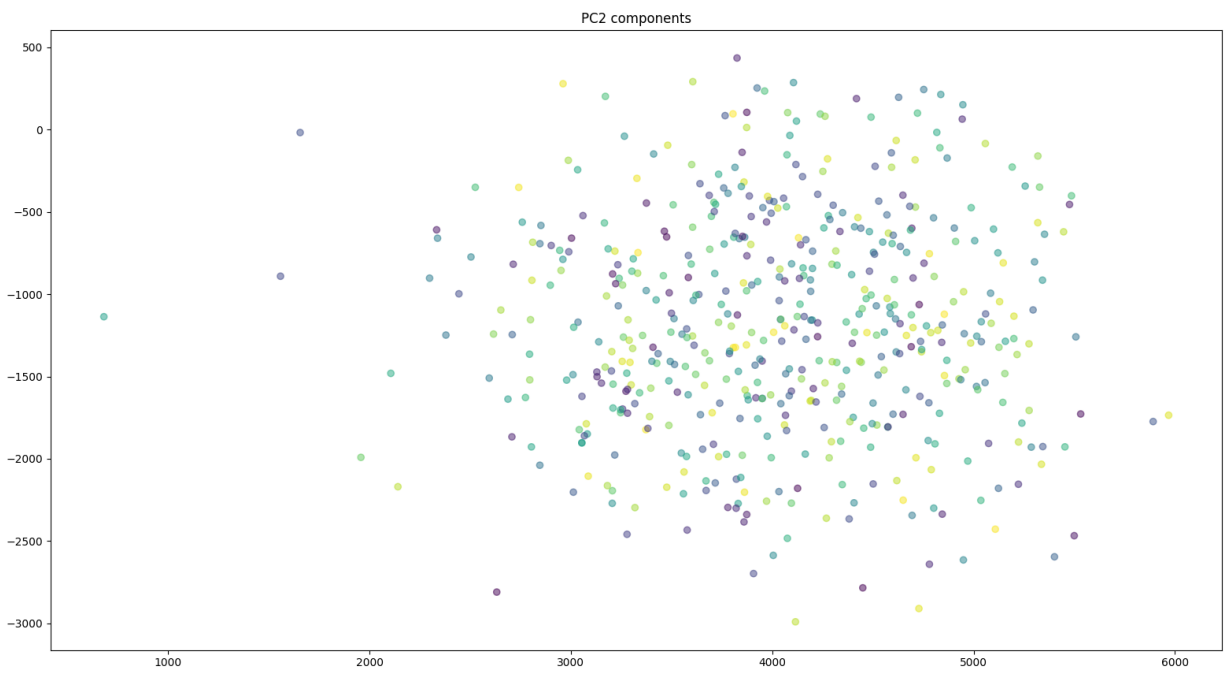
We use first K eigen vectors to reduce the data into K dimensions and reconstruct the image using them. As the value of K increases we get reconstructed image as close to original image

Scatter plots of 1D,2D,3D scatter plots with 'n' no. Of principal components

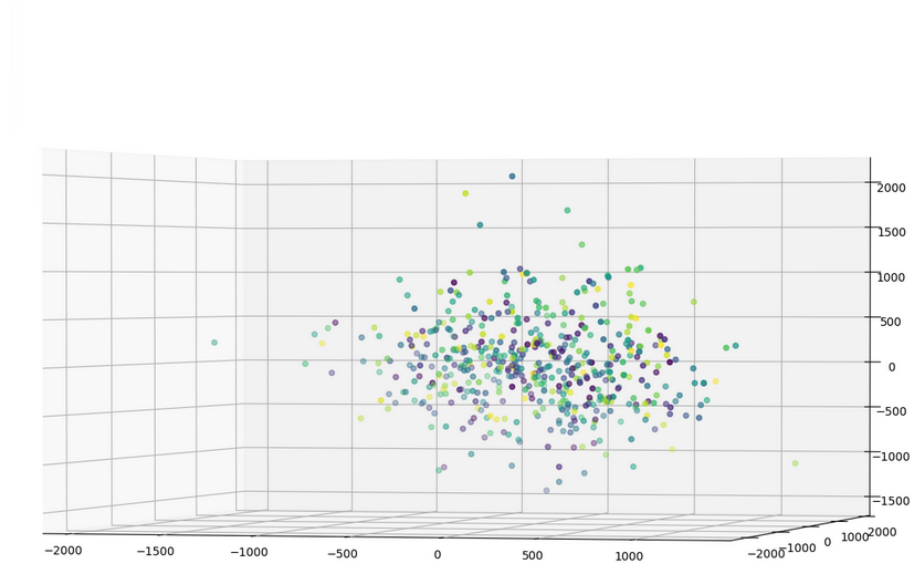
Plotting 1 principal component :



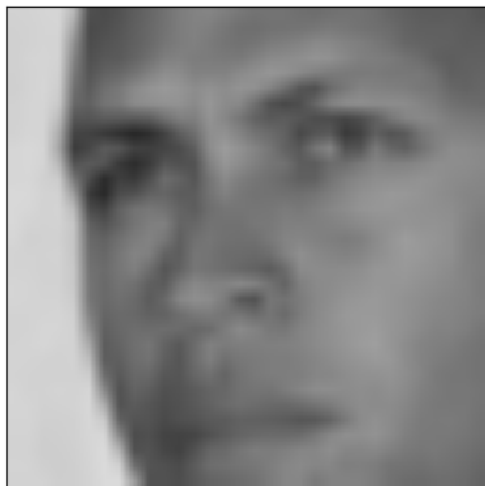
Plotting 2 principal components:



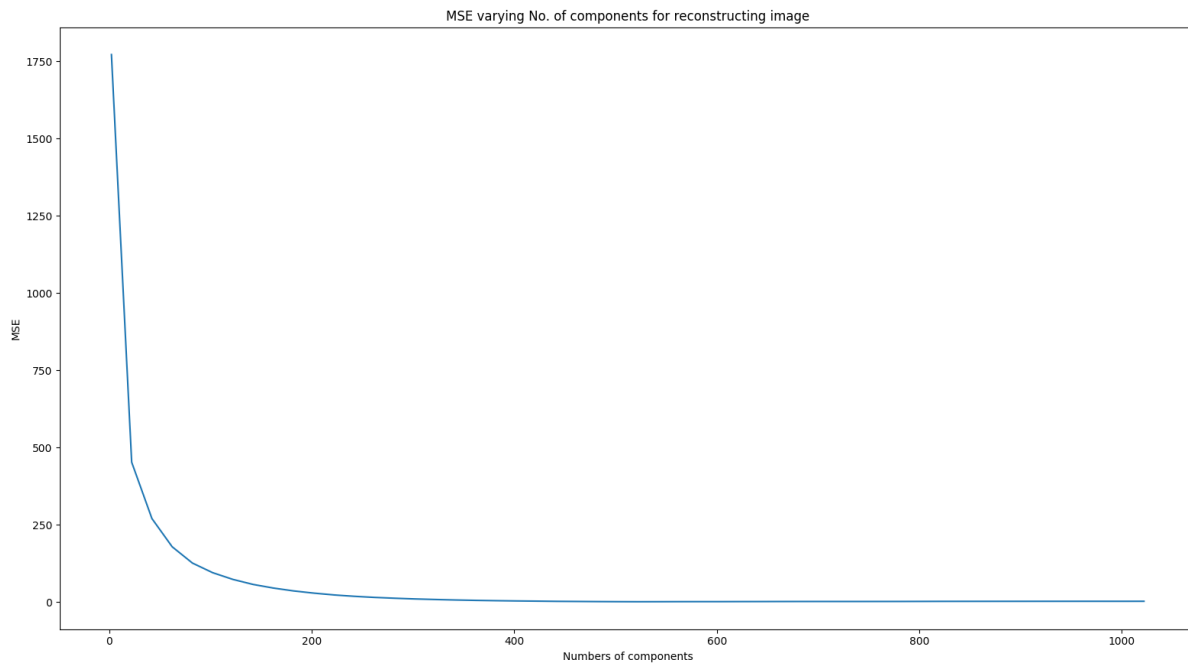
Plotting 3 principal components :



EXAMPLE of one of the reconstructed image:



MSE BY TAKING N NUMBER OF COMPONENTS PLOT



The mean square error is found by varying no. Of principal components taken for reconstructing the image from them. We can as we take more no. Of pca's the error stabilizes after some no. Of n so we can take this a threshold value for reconstructing.