SMAI Mini Project

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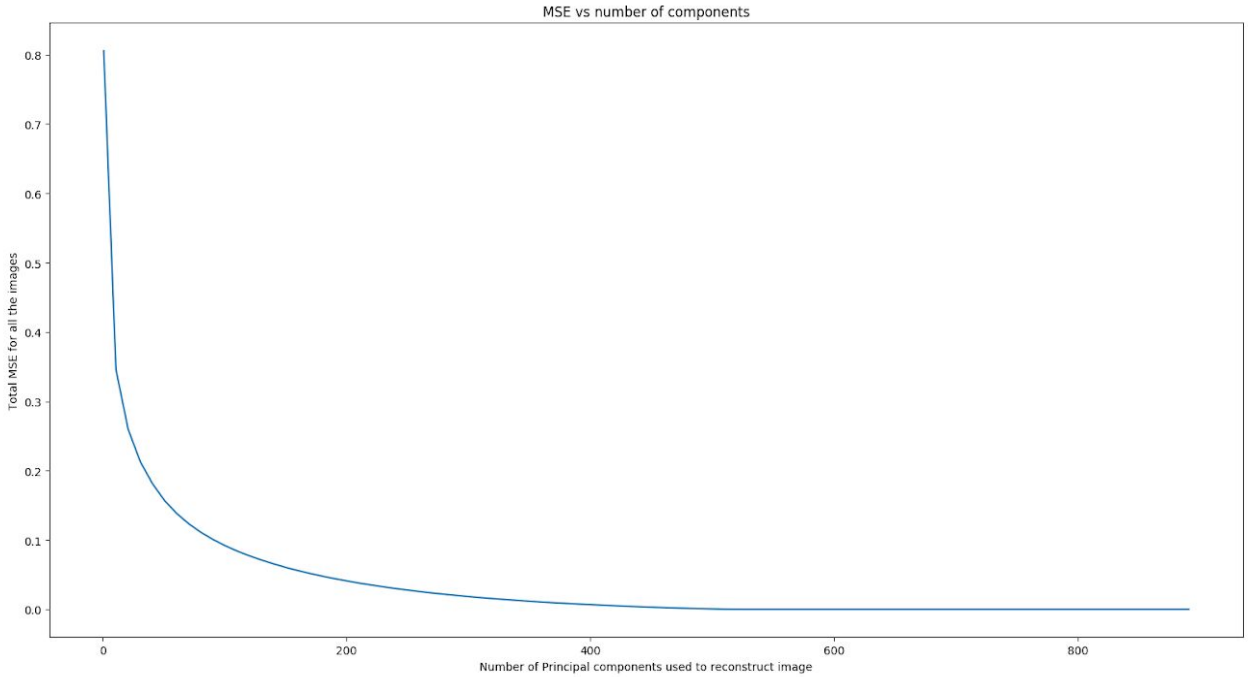
Question 1: PCA

Images are converted to grayscale and can be resized from 32x32 to 64x64 or 256x256. The SVD is computed by subtracting the mean.

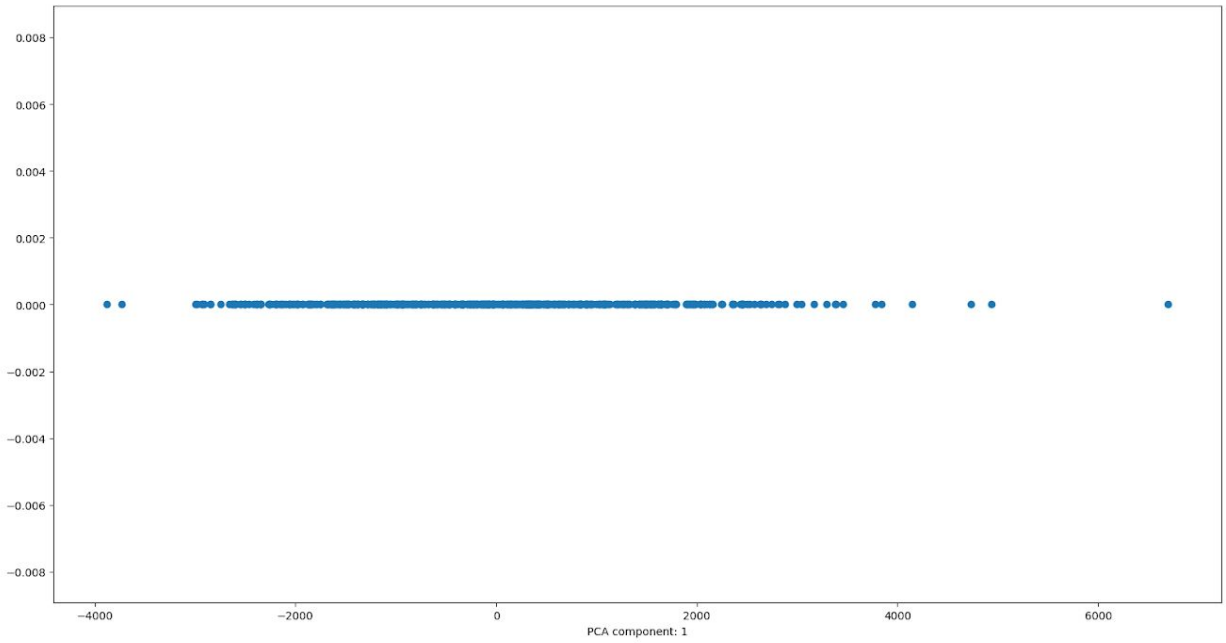
Find the coefficients of each eigenvectors in the reconstructed image, the orthonormal basis (eigenvectors) is matrix multiplied with data.

First calculate the MSE for each image and calculate the ratio by dividing from the original. Average MSE is computed for all images for different number of eigenvectors.

Here MSE reduced to less than 10% within 100 top eigenvectors.

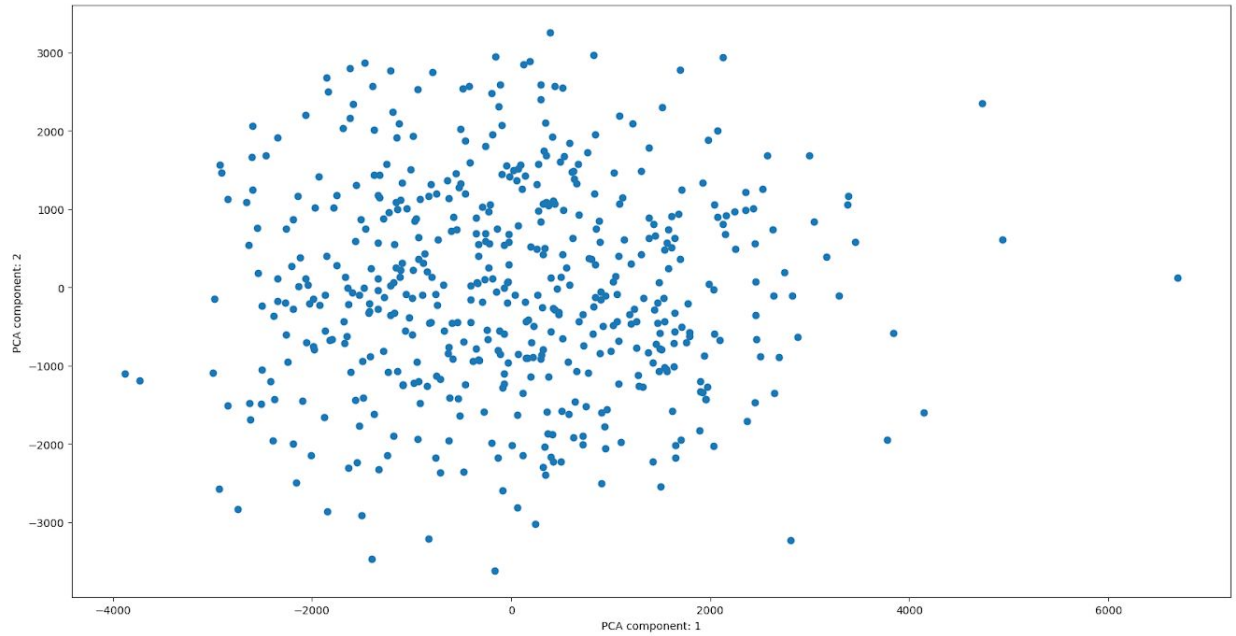


1-D Clustering



Take one principal component i.e. Coefficients of the first eigenvector for 1-D curve.

2-D Clustering



Similarly clustering in 2D is done by taking top 2 eigenvectors and their corresponding coefficients for all the images. Here is a scatter plot representation for the same.

3-D Clustering

For clustering in 3D, we take the coefficients of three eigenvectors and then plot it on a 3D plot.