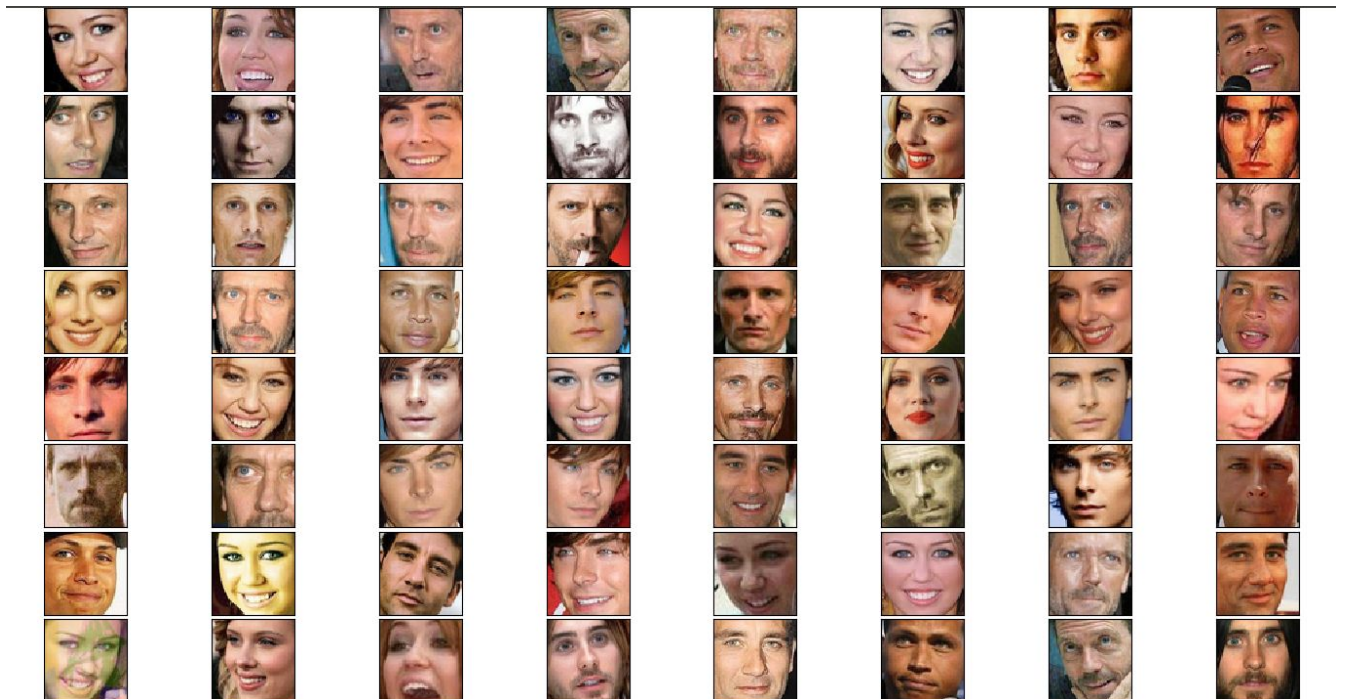# Principal Component Analysis (PCA)

Pravin Mali
20161099

Images after reconstruction

They were first compressed from 256*256 to 64*64 in order to increase the speed of the code.

MSE loss vs No. of Dimensions:

```
No. of Dimensions:  10
eigenvalue.shape:  (10,)
eigenvector.shape:  (12288, 10)
final.shape:  (520, 10)
reconstructed.shape:  (520, 12288)
MSE Loss:  36.2772212137
---------------------------------------------------------------------------
No. of Dimensions:  50
eigenvalue.shape:  (50,)
eigenvector.shape:  (12288, 50)
final.shape:  (520, 50)
reconstructed.shape:  (520, 12288)
MSE Loss:  22.7125639331
---------------------------------------------------------------------------
No. of Dimensions:  90
eigenvalue.shape:  (90,)
eigenvector.shape:  (12288, 90)
final.shape:  (520, 90)
reconstructed.shape:  (520, 12288)
MSE Loss:  18.2459738791
---------------------------------------------------------------------------
No. of Dimensions:  130
eigenvalue.shape:  (130,)
eigenvector.shape:  (12288, 130)
final.shape:  (520, 130)
reconstructed.shape:  (520, 12288)
MSE Loss:  15.2671885832
---------------------------------------------------------------------------
No. of Dimensions:  170
eigenvalue.shape:  (170,)
eigenvector.shape:  (12288, 170)
final.shape:  (520, 170)
reconstructed.shape:  (520, 12288)
MSE Loss:  13.1732659302
---------------------------------------------------------------------------
No. of Dimensions:  210
eigenvalue.shape:  (210,)
eigenvector.shape:  (12288, 210)
final.shape:  (520, 210)
reconstructed.shape:  (520, 12288)
MSE Loss:  11.5329023351
```

```
No. of Dimensions:  250
eigenvalue.shape:  (250,)
eigenvector.shape:  (12288, 250)
final.shape:  (520, 250)
reconstructed.shape:  (520, 12288)
MSE Loss:  10.109122279
---------------------------------------------------------------------------
No. of Dimensions:  290
eigenvalue.shape:  (290,)
eigenvector.shape:  (12288, 290)
final.shape:  (520, 290)
reconstructed.shape:  (520, 12288)
MSE Loss:  8.91163842119
---------------------------------------------------------------------------
No. of Dimensions:  330
eigenvalue.shape:  (330,)
eigenvector.shape:  (12288, 330)
final.shape:  (520, 330)
reconstructed.shape:  (520, 12288)
MSE Loss:  7.87329170447
---------------------------------------------------------------------------
No. of Dimensions:  370
eigenvalue.shape:  (370,)
eigenvector.shape:  (12288, 370)
final.shape:  (520, 370)
reconstructed.shape:  (520, 12288)
MSE Loss:  6.95689057664
---------------------------------------------------------------------------
No. of Dimensions:  410
eigenvalue.shape:  (410,)
eigenvector.shape:  (12288, 410)
final.shape:  (520, 410)
reconstructed.shape:  (520, 12288)
MSE Loss:  6.11416288036
---------------------------------------------------------------------------
No. of Dimensions:  450
eigenvalue.shape:  (450,)
eigenvector.shape:  (12288, 450)
final.shape:  (520, 450)
reconstructed.shape:  (520, 12288)
MSE Loss:  5.40471278482
```
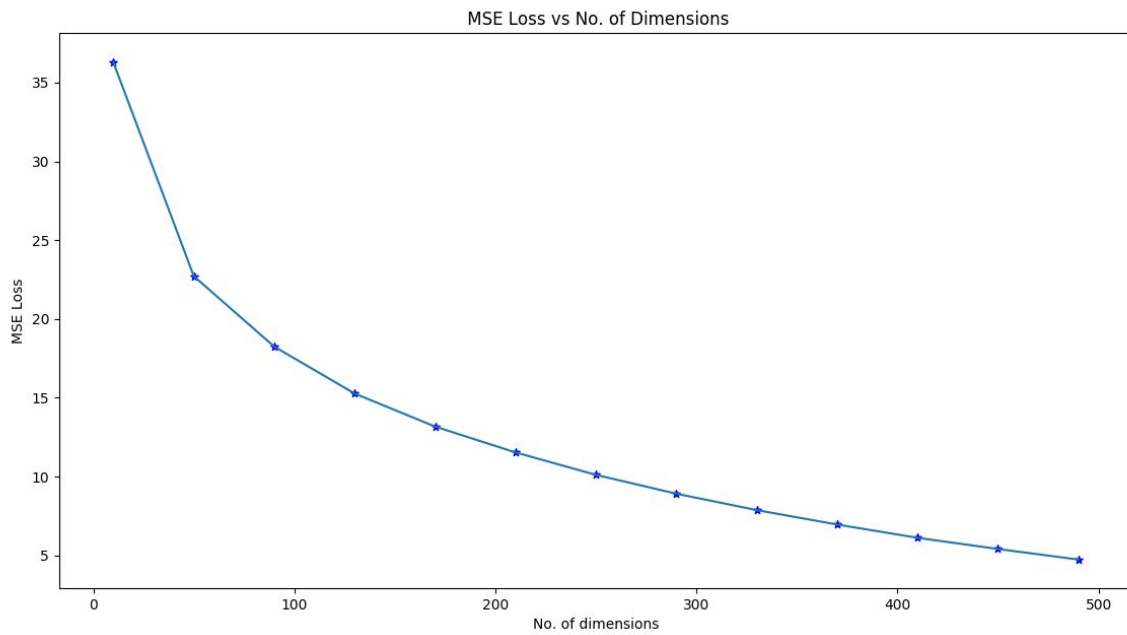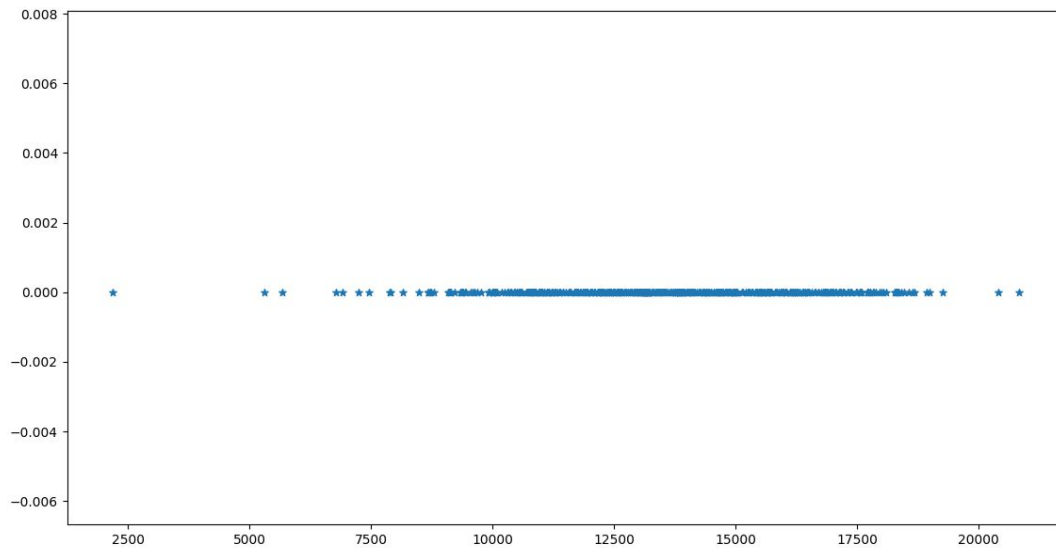
```
----------------------------------------------------------------------
No. of Dimensions:  490
eigenvalue.shape:  (490,)
eigenvector.shape:  (12288, 490)
final.shape:  (520, 490)
reconstructed.shape:  (520, 12288)
MSE Loss:  4.73507443894
32
```
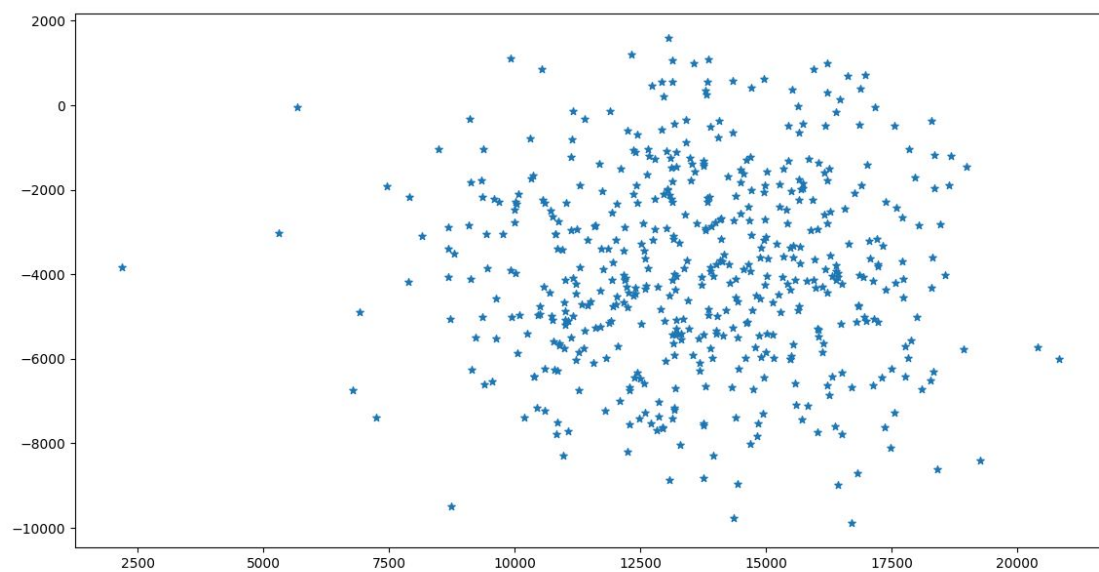
MSE Loss vs No. of Dimensions

Graphs -

No. of principal components: 1

No. of principal components: 2

No. of principal components: 3