Homework 3

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For this assignment, please hand in the following two things:

1) A .pdf file contains both your result (image) and the description about how the methods work.
2) A zip file contains your .py files. Please note that you should write the comment to explain your code.

The ready-made functions, i.e. PCA function in scikit-learn, are not allowed to use in this assignment.

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1. Programing exercise:

The attached file, "four_dataset.zip", contains 982 images of in variant appearance. Implement Principle Component Analysis to reduce the image dimension from 784 to 2, 16, 64, and 256, respectively, using Python. Compare the reconstruction result of them, visualize the image, and explain the reason why their performances are different. **(Please use "four0.jpg" to visualize your result.)**

2. Programing exercise:

The attached file, "mixture_dataset(0147).zip", contains 1000 images which were mixed by , , , and , with different ratio. Please Implement NMF method, using Python, to factorize these four main components from the 1000 images, and explain your results.