HW1-Report

1. Method description

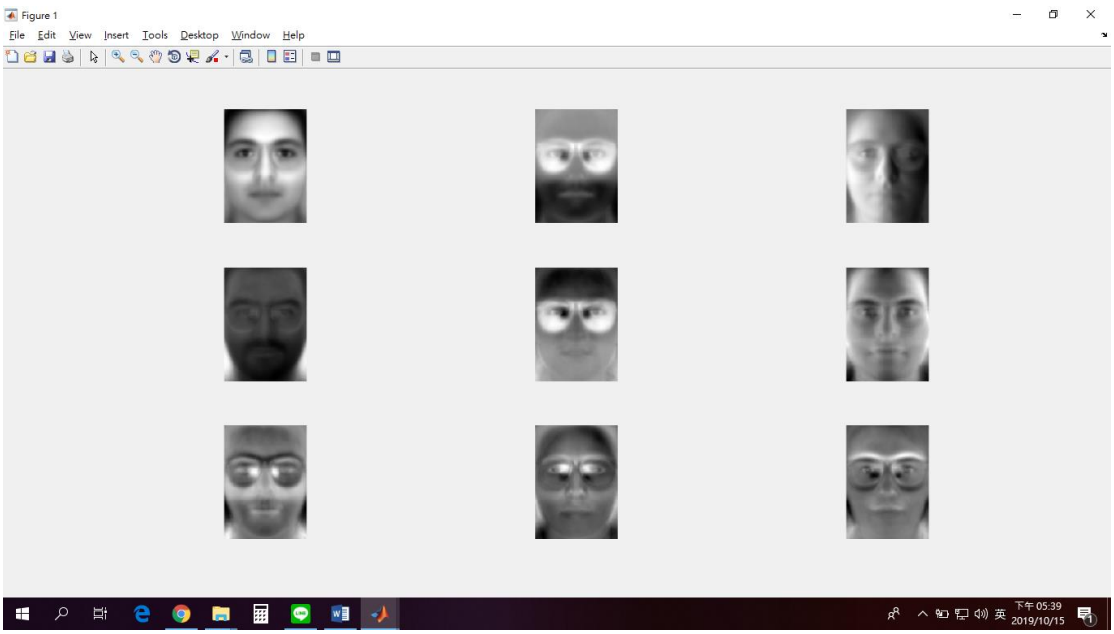
Require version:

Because I use readmatrix()、writematrix(), the version must be above **2019**

- hw1_1: I use the function pca() to generate eigenvector and eigenvalue. Then I can generate the dimension 1,5,9 eigenfaces.
- hw1_2: About the random test image, I choose the subject 20 as my data. After reading the images, using images and eigenfaces get the coefficient, and use the coefficient and eigenfaces to calculate the original image.
- hw2_1: I project the train images and test images to the eigenspace. And using the knnsearch() calculate the nearest neighbor to get the error rate.

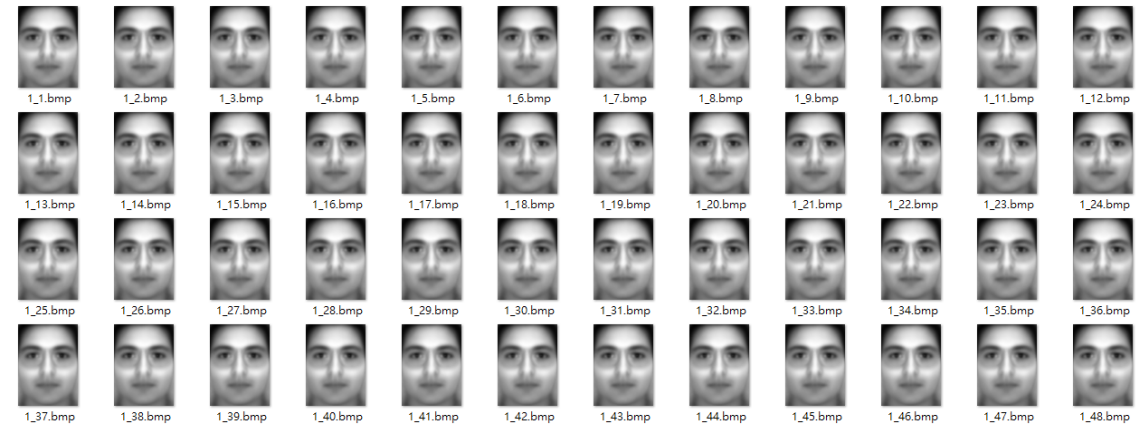
2. Experimental results

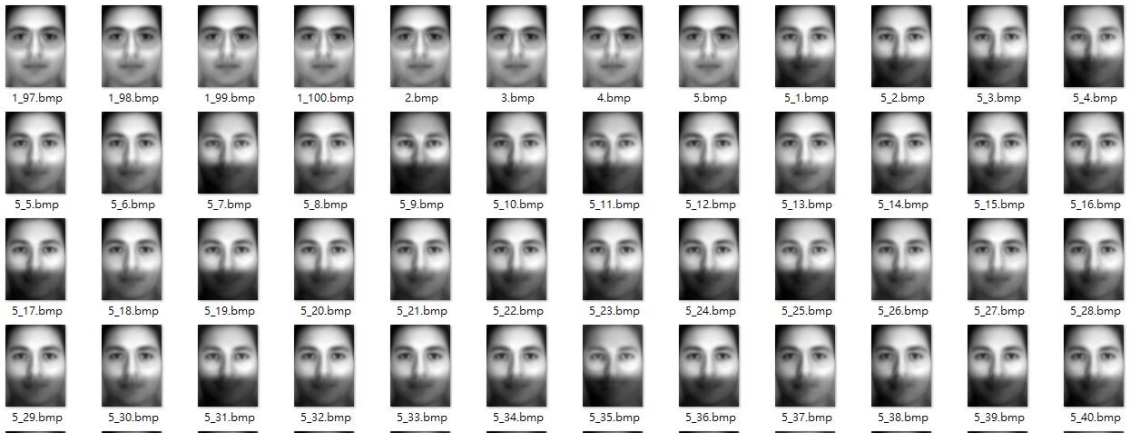
Ans(a)-i

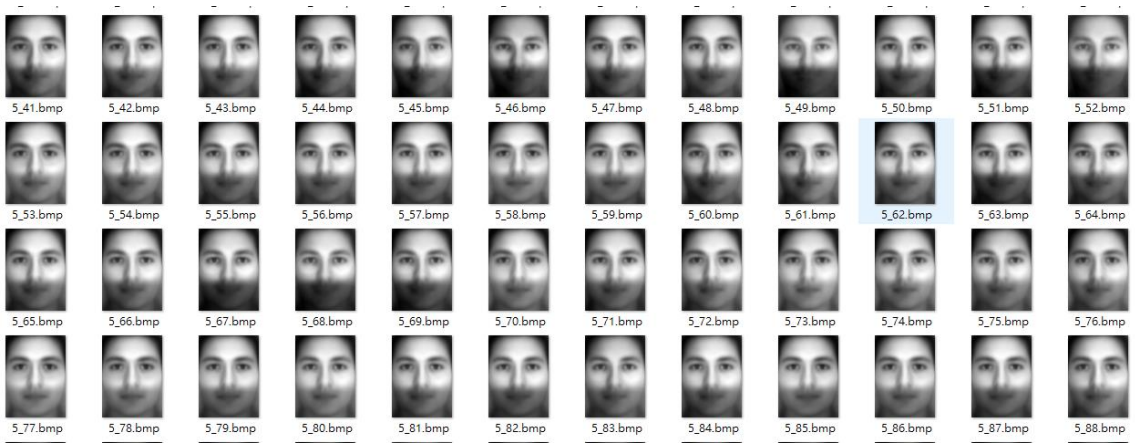


Ans(a)-ii

The first word of file name is the dimension.






5_41.bmp
5_42.bmp
5_43.bmp
5_44.bmp
5_45.bmp
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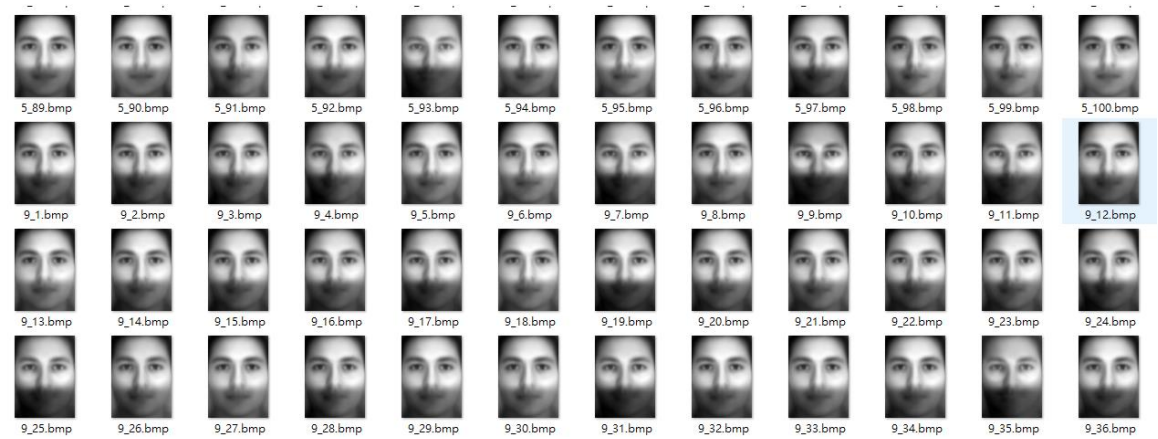
5_88.bmp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5_99.bmp
5_100.bmp
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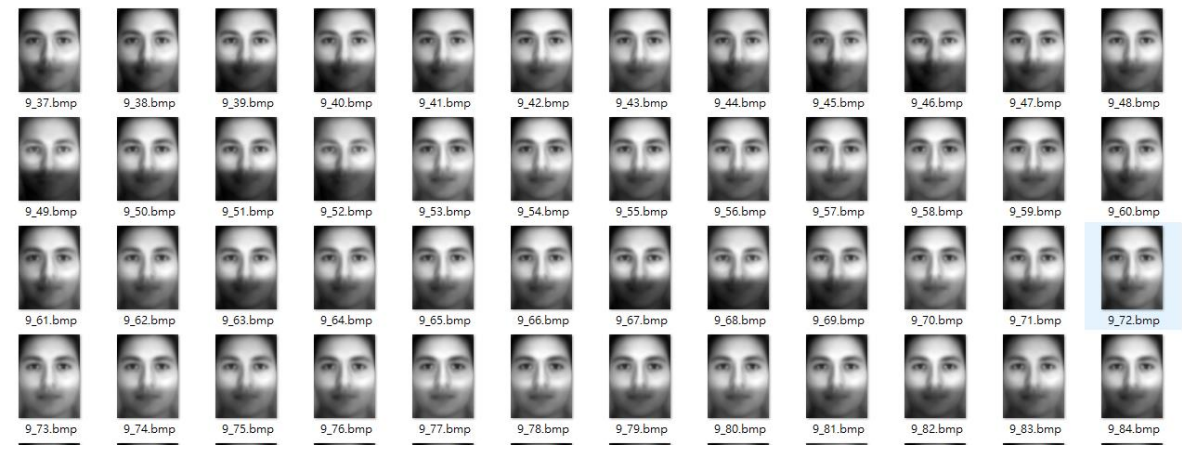
9_37.bmp
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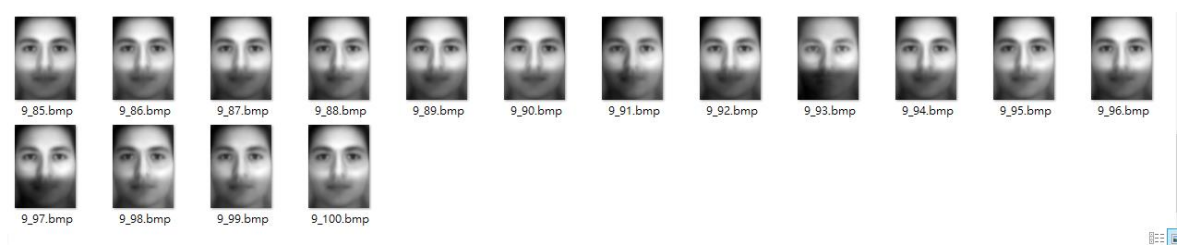
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9_100.bmp

Ans(b)

D=1, error rate : 0.997692

D=5, error rate : 0.810769

D=9, error rate : 0.756923

3. Discussion

By the homework, I understand the concept of pca more clearly. We can use pca to generate the dimensionality reduction data. Having these data we can reduce the complexity of data. Take machine learning for example, dimensionality reduction is way to reduce the complexity of a model and avoid overfitting

4. Problem and difficulties

In the process of coding, the problem of matrix dimension is the difficulties that I often encounter. And my concept of eigenfaces is not very clear, so it also cause trouble for me.