Homework 3

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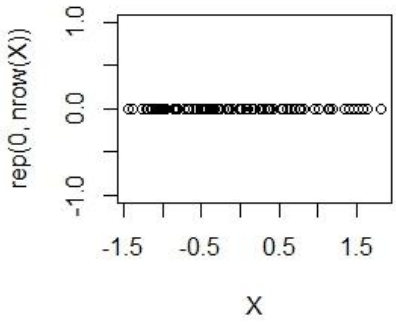
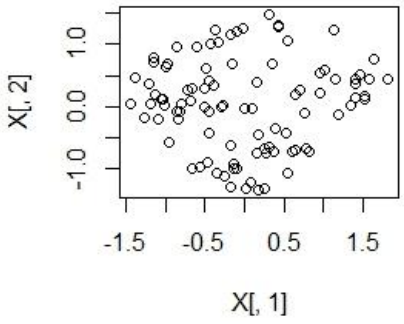
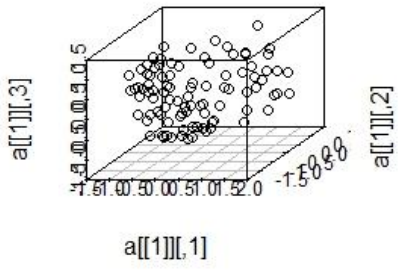
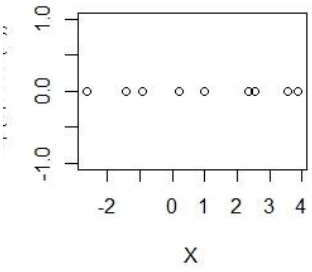
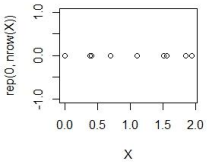
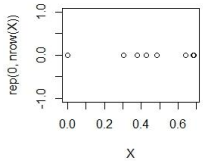
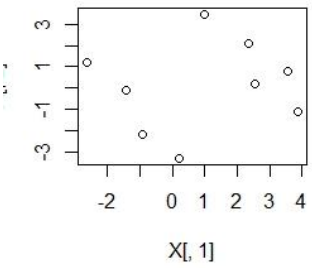
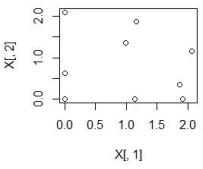
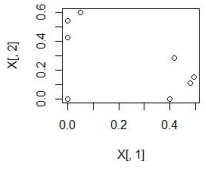
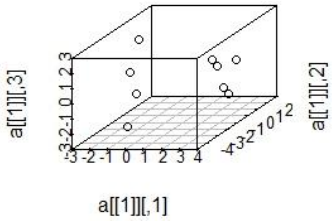
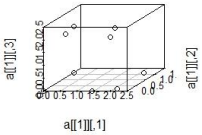
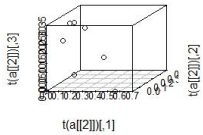
Question 1 : Do PCA (Principle Component Analysis) with assign31.csv

Demonstrates	Graph	information reserve
1		0.2139058
2		0.396026
3		0.5165856

4	0.595481
5	0.6697862
6	0.7381548
7	0.7905304
8	0.8367713
9	0.8798061
10	0.920202
11	0.9500036

Question 2 : Do PCA and NMF with assign32.csv and explain the difference between them.

Demonstrates	PCA	NMF
1		 W  H
	Information reserve 0.4326317	Error 0.4326317
2		 W  H
	Information reserve 0.7648243	Error 0.1417607

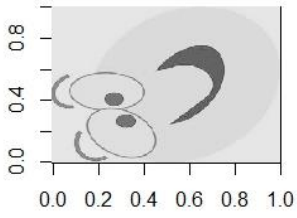
3		 	W H
	Information reserve 0.9298461	Error 0.06324455	
4	Information reserve 0.9918732	Error 0.009525376	
5	Information reserve 0.9967265	Error 0.009675278	
6	Information reserve 1	Error 0.008793702	

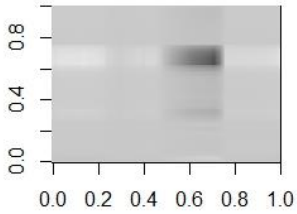
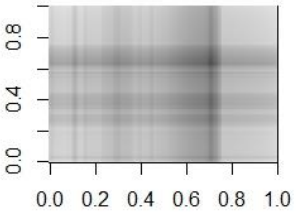
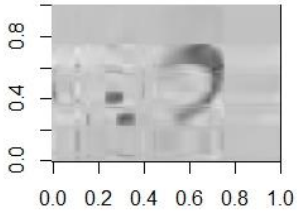
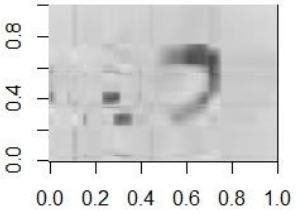
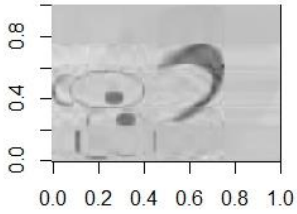
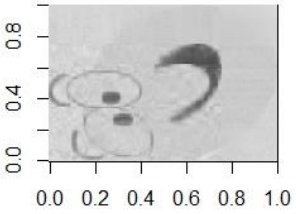
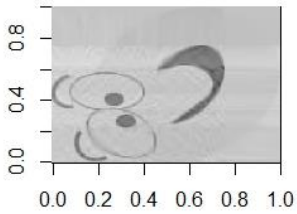
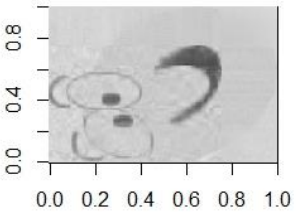
We can find the capacity of reserving information of PCA and NMF are similar, over three demonstrates, we can save more than ninety-nine percent of the information.

And in PCA we need calculate the eigenvalues and eigenvectors of the covariance matrix, and in NMF we find how to make the norm of WH-X minimum.

Question 2 : Do PCA and NMF with test2.csv and explain the difference between them.

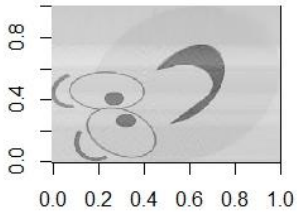
Original Photo

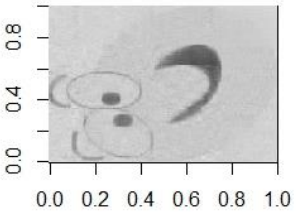


Demonstrates	PCA	NMF
1		
	Information reserve 0.3474913	Error 0.05002276
5		
	Information reserve 0.6676473	Error 0.02084154
10		
	Information reserve 0.8050326	Error 0.01257145
20		

Information reserve 0.9041759 Error 0.009992646

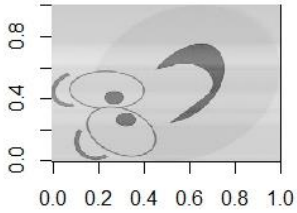
50

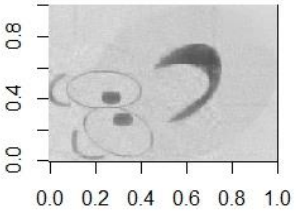




Information reserve 0.9782281 Error 0.00998637

100





Information reserve 0.9977143 Error 0.009870262

We can find in this case, the ability of information reservation of NMF are better than PCA, however, the consequence are similar, we can see, over twenty demonstrate, we can see clearly the picture.