Mini project # 1

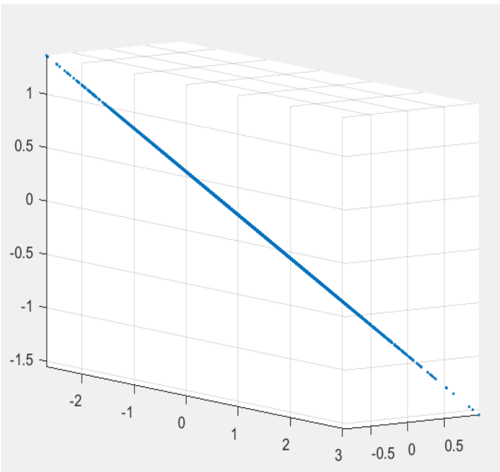
Submitted By:

Neelu Choudhary
5085296

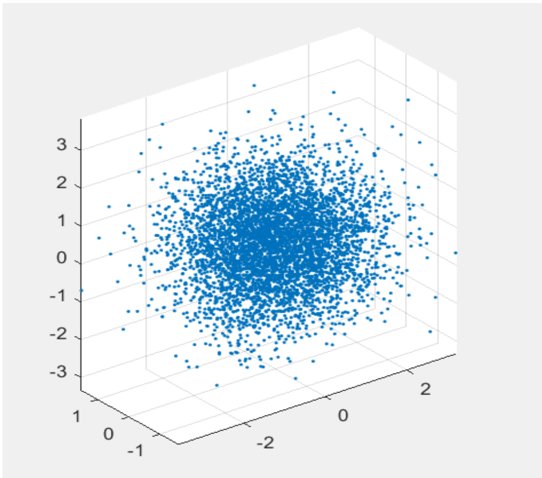
PART1

a)

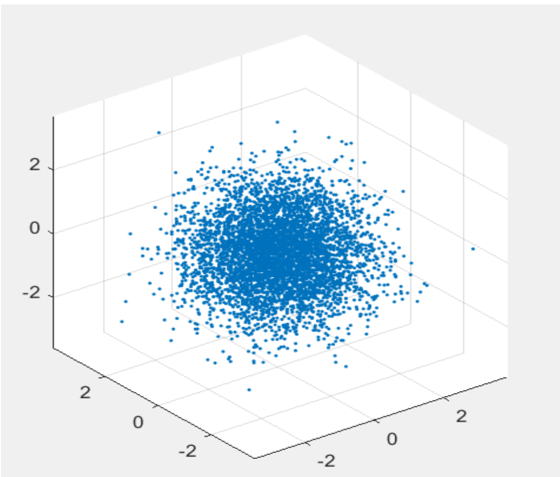
r=1



r=2

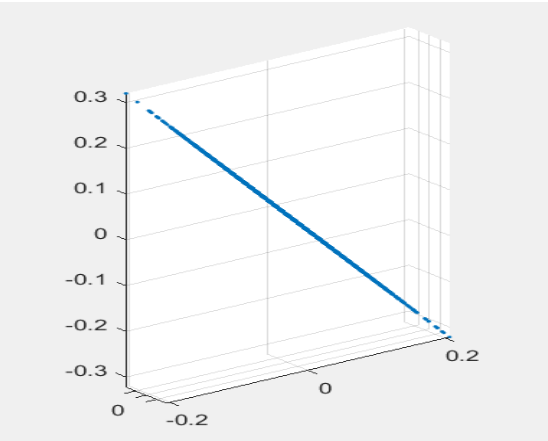


r=3

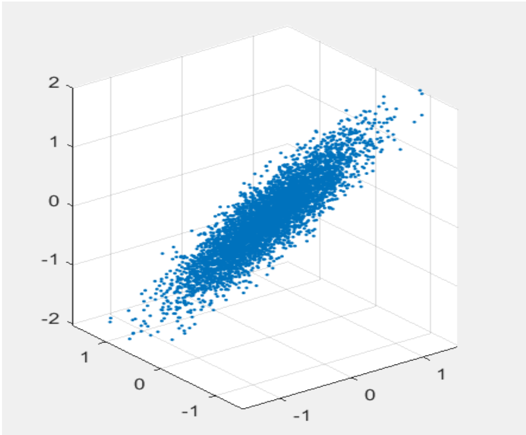


c)

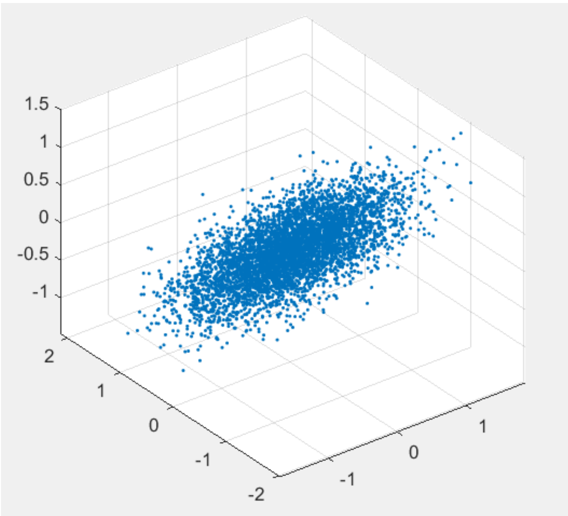
r=1


0.3
0.2
0.1
0
-0.1
-0.2
-0.3
0
-0.2
0
0.2

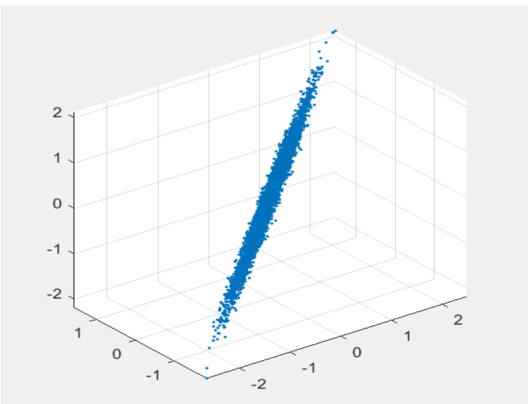
r=2


2
1
0
-1
-2
1
0
-1
-1
0
1

r=3


1.5
1
0.5
0
-0.5
-1
2
1
0
-1
-2
-1
0
1

d)


2
1
0
-1
-2
1
0
-1
-2
-1
0
1
2

Part 2

2)

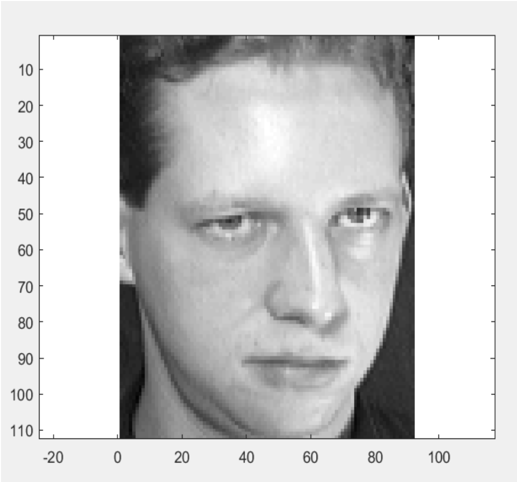
```
[n,p]=size(Z); % finding the dimension of Z
mz=zeros(n,1);
%calculating mean of columns of Z matrix
 for k=1:p
    mz=mz+Z(:,k);
 end
mz=mz/p;
% Finding centred matrix by subtracting mean of columns from Z
Zc=zeros(n,p);
for k=1:p
    Zc(:,k)=Z(:,k)-mz;
end
% Calculating Unitary matrix and eigenvalues
[A,B,C]=svd(Zc/sqrt(p-1));
prompt='what is the value of r?';  % Asking for r
r=input(prompt);
% Finding Principal component matrix
U=zeros(n,r);
for k=1:r
    U(:,k)=A(:,k);
end
save 'U.mat' 'U';
```

3)

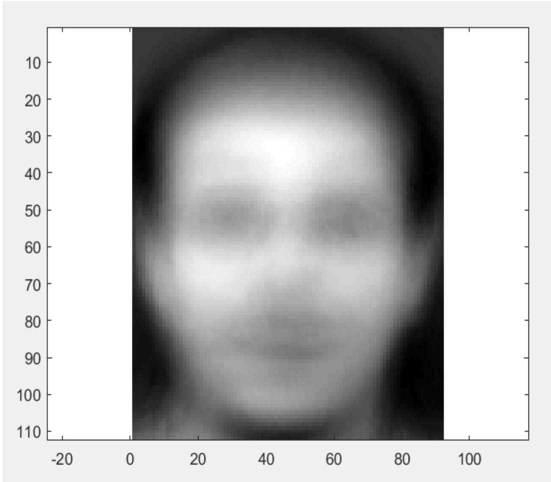
```
% calculating mean centered input T matrix and orthogonal
extimation
Tx=zeros(n,2);
P=zeros(n,2);
for k=1:2
    Tx(:,k)=T(:,k)-mz;
    P(:,k)=U*U'*Tx(:,k);
end
% output matrix by adding back the mean vector
Ty=zeros(n,2);
for k=1:2
    Ty(:,k)=P(:,k)+mz;
end
% drawing the image
reshapedimage = reshape(Ty(:,2), 112,92);
    imagesc(reshapedimage); colormap gray; axis equal;
    drawnow;
    pause(0.01);
```

Image 1 :

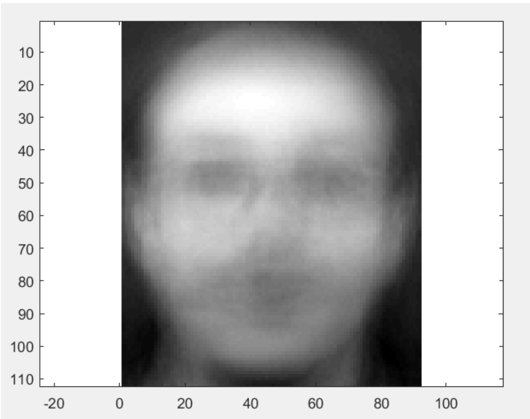
Original



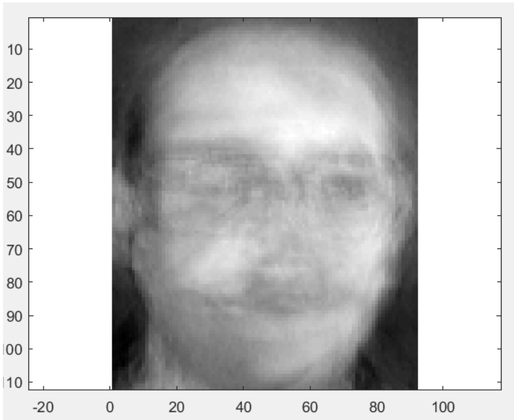
r = 0



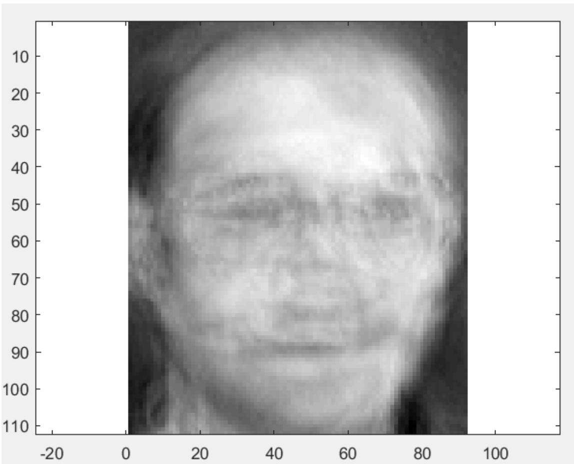
r=1



r= 25



r=50



r= 100

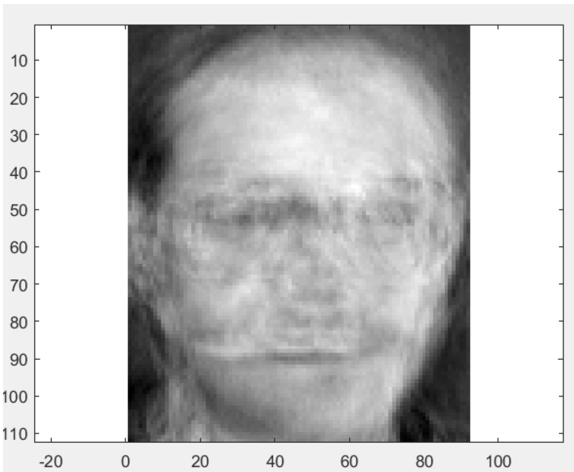
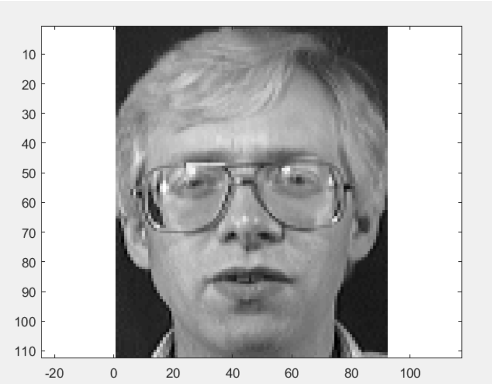
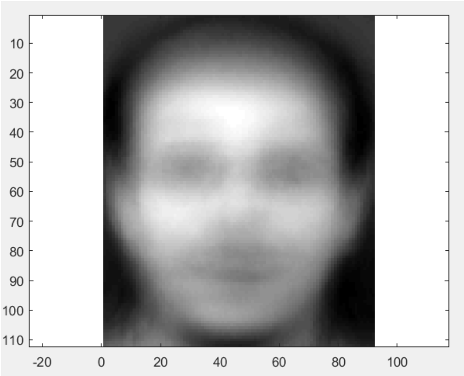


Image 2

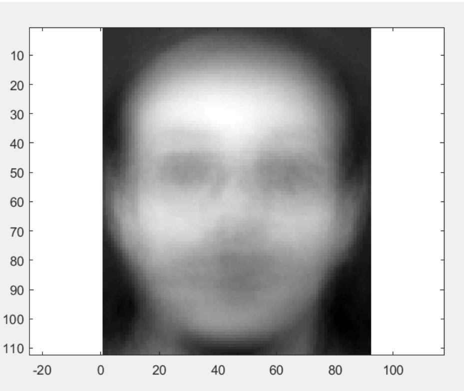
Original



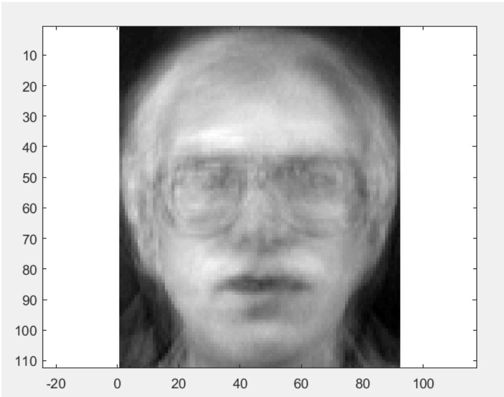
r= 0



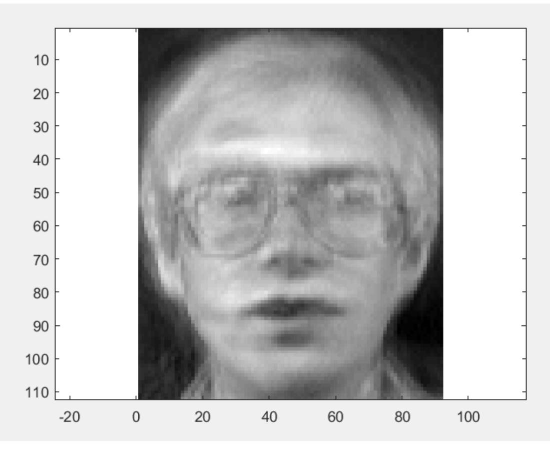
r= 1



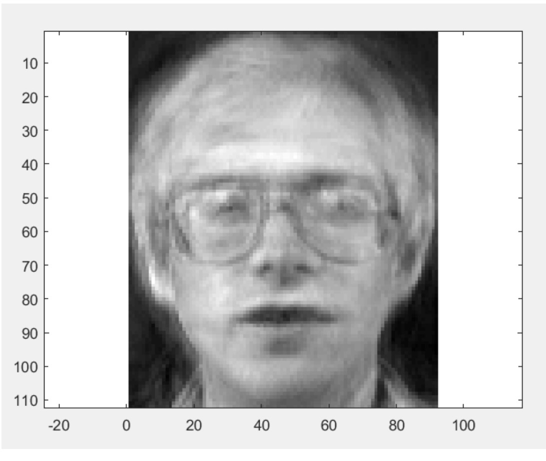
r = 25



r=50



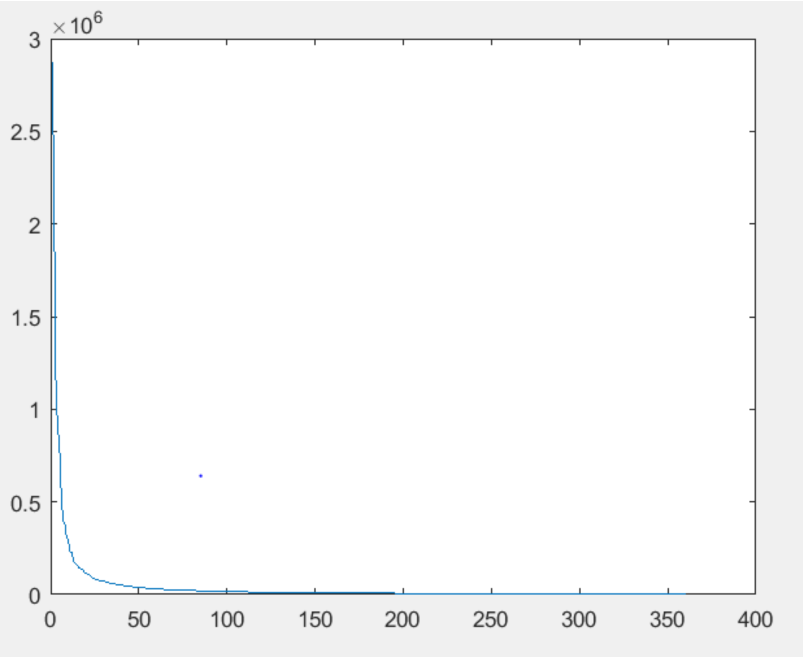
r =100



As the value of r increases the output image becomes more focused and clear. Because we are taking more dimensions into account while aproximating the data for highter r.

4)

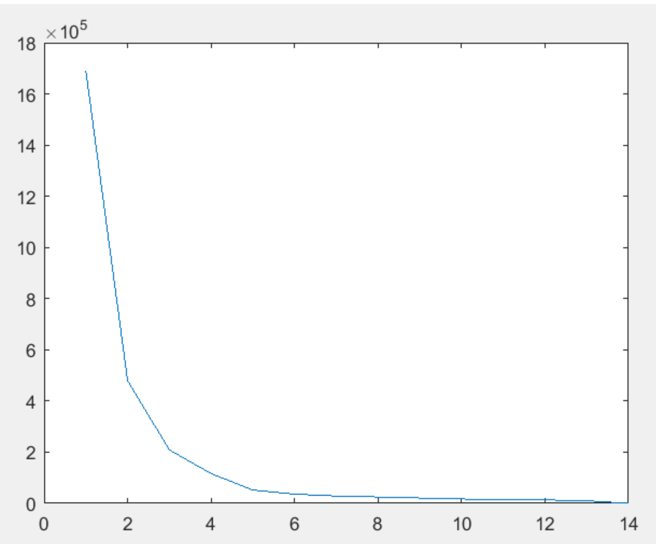
graph of eigen values



From the above figure it can be said that r=100 (approximately) is enough for approximation. The relevant number of eigenvalues are much smaller than total.

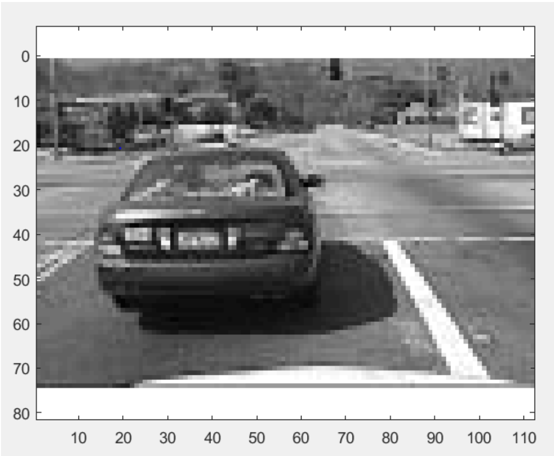
Part 3

eigenvalues

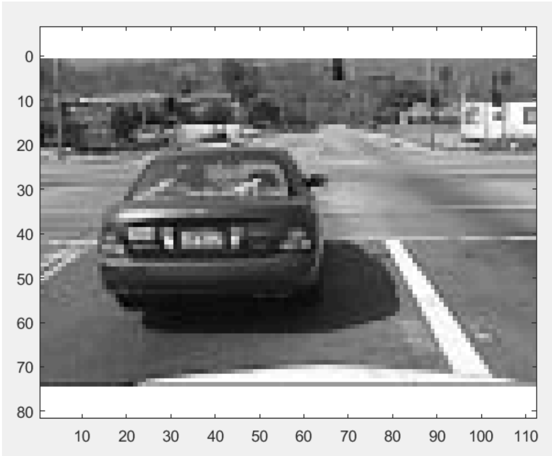


r=10 is enough for approximation

original



r=10



r=5