ASSIGNMENT – 7

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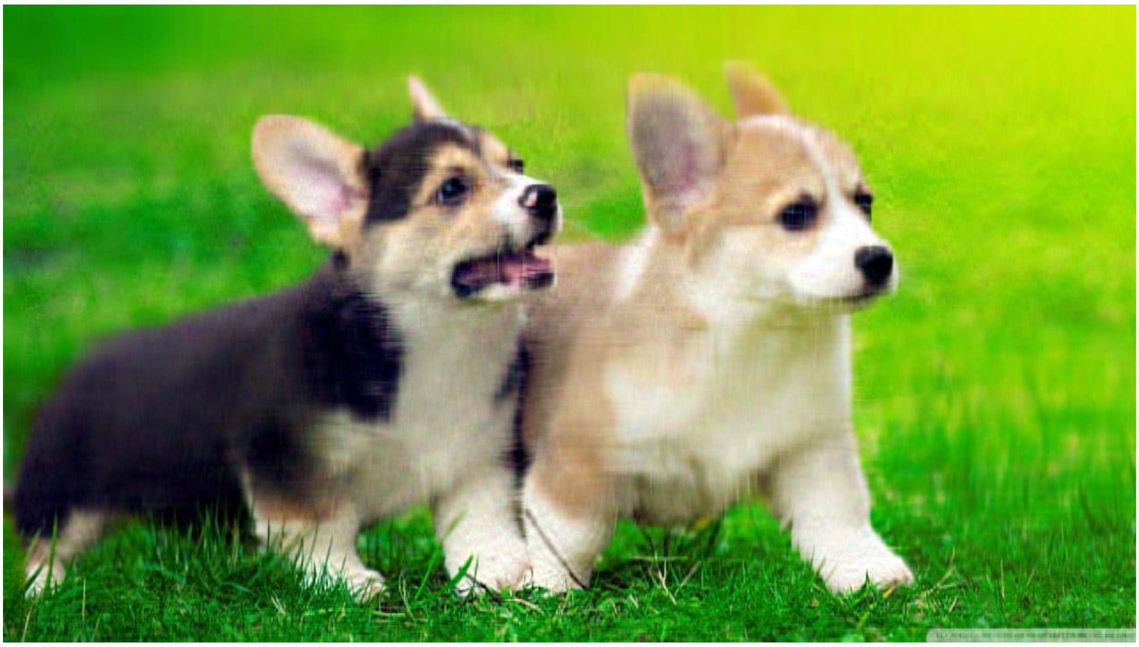
Q1-MATLAB CODE

```
I = imread('image.jpg','jpg');
figure; imshow(I)
title('Original Image')

R=I(:,:,1);
G=I(:,:,2);
B=I(:,:,3);

components_sizes=[50 100 500];

for i=1:length(components_sizes)

    RR=double(R);
    [R_coeff,R_score,R_latent]=pca(RR);

R_compressed=uint8(R_score(:,1:components_sizes(i))*R_coeff(:,1:
components_s zes(i))' + mean(R));

    GG=double(G);
    [G_coeff,G_score,G_latent]=pca(GG);

G_compressed=uint8(G_score(:,1:components_sizes(i))*G_coeff(:,1:
components_sizes(i))' + mean(G));

    BB=double(B);
    [B_coeff,B_score,B_latent]=pca(BB);

B_compressed=uint8(B_score(:,1:components_sizes(i))*B_coeff(:,1:
components_sizes(i))' + mean(B));


compressed_image=cat(3,R_compressed,G_compressed,B_compressed);
figure;
```

```
    imshow(compressed_image)
title(['Compressed Image using PCA =
',num2str(components_sizes(i))]); End
```

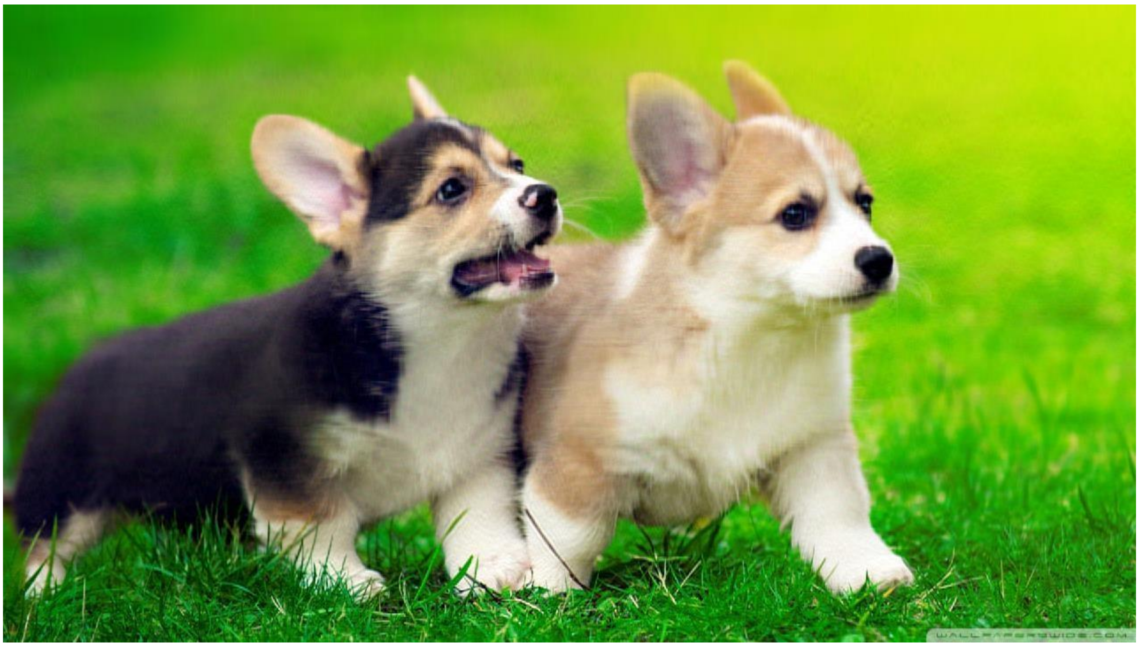
OUTPUT FROM COMMAND WINDOW -

Original Image

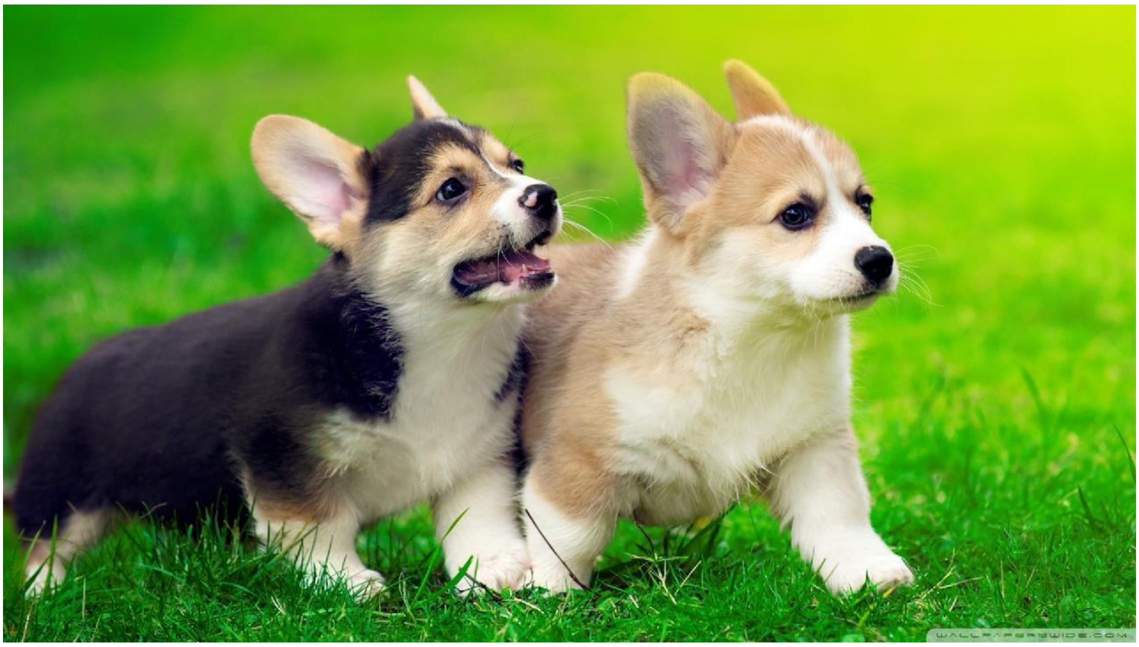


Compressed Image using PCA = 50

Compressed Image using PCA = 100



Compressed Image using PCA = 500



Q2-MATLAB CODE

```
 function
[lam,x,no_iter]=SelfPower(A,x0,maxNumIter,tol) x=x0;
lam=zeros(maxNumIter,1);
k=1;
```

```
while k<=maxNumIter
x=A*x;     x=x/norm(x);
l=transpose(x)*A*x;
lam(k,1)=l;     if k>1
        if abs(lam(k,1)-lam(k-1,1))<=tol*abs(lam(k,1))
no_iter=k;              for i=k+1:maxNumIter
lam(i,1)=lam(k,1);              end             break;
end     end     k=k+1; end
```

VERIFICATION –

MATLAB CODE –

```
A=[17 24 1 8 15;23 5 7 14 16;4 6 13 20 22;10 12 19 21 3;11 18 25
2 8]; tol=10.^(-8);
[n,n]=size(A);
x0=zeros(n,1);
x0(1,1)=1;
maxNumIter=100;
[lam,x,no_iter]=SelfPower(A,x0,maxNumIter,tol);
disp('dominant eigen vector :'); x
disp('no. of iterations required :')
no_iter datasave=[]; disp('required
table :') fprintf('       Iter
lambda\n') for i=1:maxNumIter
    datasave=[datasave; i lam(i,1)]; end
disp(datasave);
```

OUTPUT FROM COMMAND WINDOW –

```
dominant eigen vector :
x =
    0.4484
0.4483     0.4478
0.4497
    0.4418  no. of
iterations required :
 no_iter
=
    10  required
table :
Iter lambda
```

```
    1.0000   54.4351
2.0000   63.6263     3.0000
64.6978     4.0000
64.7916     5.0000
64.8013     6.0000
64.8023     7.0000
64.8024     8.0000
64.8024     9.0000
64.8024    10.0000
64.8024    11.0000
64.8024    12.0000
64.8024    13.0000
64.8024    14.0000
64.8024    15.0000
64.8024    16.0000
64.8024    17.0000
64.8024    18.0000
64.8024    19.0000
64.8024    20.0000
64.8024    21.0000
64.8024    22.0000
64.8024    23.0000
64.8024    24.0000
64.8024    25.0000
64.8024    26.0000
64.8024    27.0000
64.8024    28.0000
64.8024    29.0000
64.8024    30.0000
64.8024
   31.0000   64.8024
     32.0000   64.8024
    33.0000   64.8024
    34.0000   64.8024
    35.0000   64.8024
    36.0000   64.8024
    37.0000   64.8024
    38.0000   64.8024
    39.0000   64.8024
    40.0000   64.8024
    41.0000   64.8024
    42.0000   64.8024
    43.0000   64.8024
    44.0000   64.8024
    45.0000   64.8024
    46.0000   64.8024
    47.0000   64.8024
    48.0000   64.8024
    49.0000   64.8024
    50.0000   64.8024
    51.0000   64.8024
    52.0000   64.8024
    53.0000   64.8024
    54.0000   64.8024
    55.0000   64.8024
    56.0000   64.8024
    57.0000   64.8024
    58.0000   64.8024
    59.0000   64.8024
    60.0000   64.8024
    61.0000   64.8024
    62.0000   64.8024
    63.0000   64.8024
    64.0000   64.8024
    65.0000   64.8024
    66.0000   64.8024
    67.0000   64.8024
    68.0000   64.8024
    69.0000   64.8024
    70.0000   64.8024
    71.0000   64.8024
    72.0000   64.8024
    73.0000   64.8024
    74.0000   64.8024
    75.0000   64.8024
    76.0000   64.8024
    77.0000   64.8024
    78.0000   64.8024
    79.0000   64.8024
   80.0000   64.8024
   81.0000   64.8024
82.0000   64.8024    83.0000
64.8024    84.0000   64.8024
85.0000   64.8024    86.0000
64.8024    87.0000   64.8024
88.0000   64.8024    89.0000
64.8024    90.0000   64.8024
91.0000   64.8024    92.0000
64.8024    93.0000   64.8024
94.0000   64.8024    95.0000
64.8024    96.0000   64.8024
97.0000   64.8024    98.0000
64.8024    99.0000   64.8024
100.0000   64.8024
```

Q3-MATLAB CODE

```
 function
[U,no_iter]=SelfQRIter(A,maxNumIter,tol) k=1;
[n,n]=size(A); while k<=maxNumIter
    B=A;
    [Q,R]=HouseSelf(A,n,n);
    A=R*Q;
    M = tril(B);% lower traingular portion of B
N = tril(A);% lower traingular portion of A
if k>1
        if norm(N-M,'fro')<=tol*norm(A,'fro')
            no_iter=k;
break;          end
end     k=k+1; end U=A;
if k>maxNumIter
no_iter=maxNumIter; end
```

VERIFICATION –

MATLAB CODE –

```
A=[17 24 1 8 15;23 5 7 14 16;4 6 13 20 22;10 12 19 21 3;11 18 25
2 8];
disp('eigen values of A using built-in function :')
eig(A) maxNumIter=10000; tol=10.^(-8);
[U,no_iter]=SelfQRIter(A,maxNumIter,tol);
disp('upper triangular form of A containing eigen value of A
:');
U
disp('no. of iterations required :'); no_iter
```

OUTPUT FROM COMMAND WINDOW –

```
 eigen values of A using built-in function
:
 ans
=

  64.802406480784541  -
21.678696364211952
 -13.155732897078570
  21.289162623345796
  12.742860157160198  upper triangular form of A
containing eigen value of A :
```

```
U =

   64.8024   -0.0179    0.0237   -0.0206   -0.0121    -
0.0000  -21.6787    2.4637   -2.3946   -3.4732
    0.0000    0.0000   21.2892    3.3983    2.8616    -
0.0000   -0.0000   -0.0000  -13.1557   -2.5286
   -0.0000    0.0000    0.0000    0.0000   12.7429
 no. of iterations required
:
 no_iter
=
        1081
```