CPS-563 Data Visualization

ASSIGNMENT-3 REPORT

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For this assignment we initially, have downloaded data from the places folder containing images in "**Images**" and "**Test**" folders.

Problem (a)

Resizing all images in both folders to the size of 64x64 and converting them to grayscale images

CODE:

```
imagefiles=dir('.\places\Images\*.jpg');
len=length(imagefiles);

testfiles=dir('.\places\Test\*.jpg');
testlen=length(testfiles);

imageData=zeros(64*64,len);
testData=zeros(64*64,testlen);

for i=1:len

    img=imread(strcat('.\places\Images\',imagefiles(i).name));
    img=imresize(img,[64,64]);

    img=im2gray(img);
    imageData(:,i)=img(:);

end

for i=1:testlen

    img=imread(strcat('.\places\Test\',testfiles(i).name));
    img=imresize(img,[64,64]);

    img=im2gray(img);
    testData(:,i)=img(:);
```

```
end
```

Problem (b)

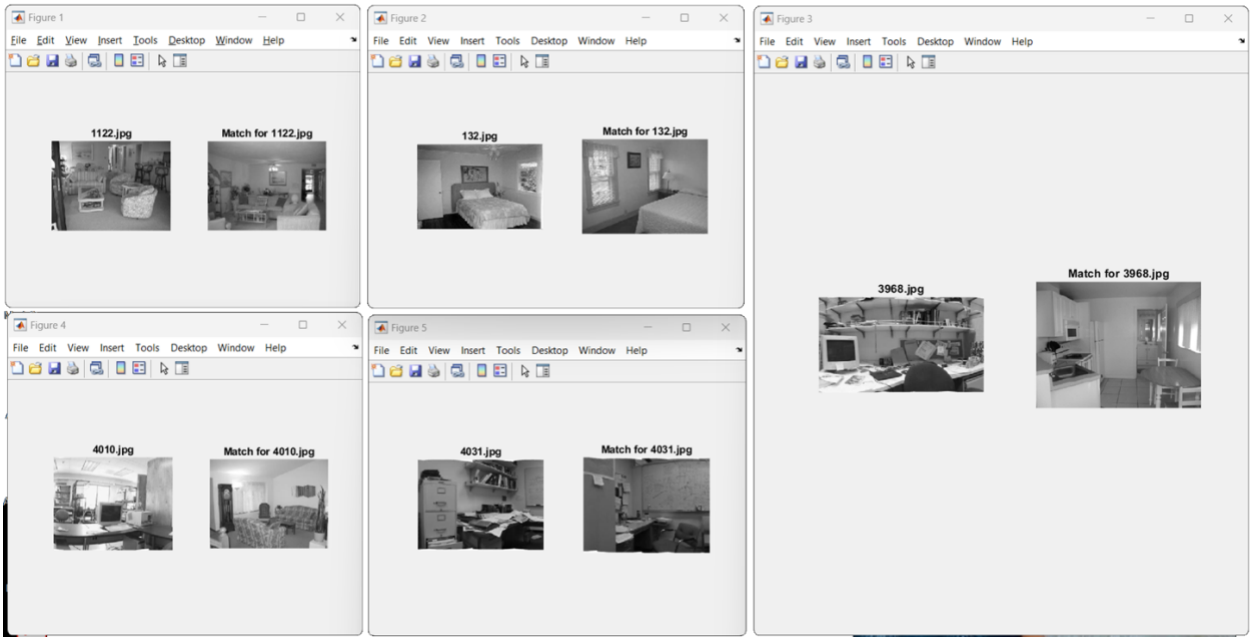
Plotting the **Test** image with the most similar image in the **Images** folder using distance computation

CODE:

```
for j=1:testlen
   distMat=zeros(1,len);

   for i=1:len
      dist=sqrt(sum((testData(:,j)-imageData(:,i)).^2));
      distMat(i)=dist;
   end

   minDist=min(distMat);
   minIndex=find(distMat==minDist);

   figure;
   subplot(1,2,1);
   limg=imread(strcat('.\places\Test\',testfiles(j).name));
   imshow(limg);
   title(testfiles(j).name);
```

```
    subplot(1,2,2);
    rimg=strcat('.\places\Images\',imagefiles(minIndex).name);
    imshow(rimg);
    title(strcat('Match for',{' '},testfiles(j).name));

end
```

OUTPUT:



Problem (c)

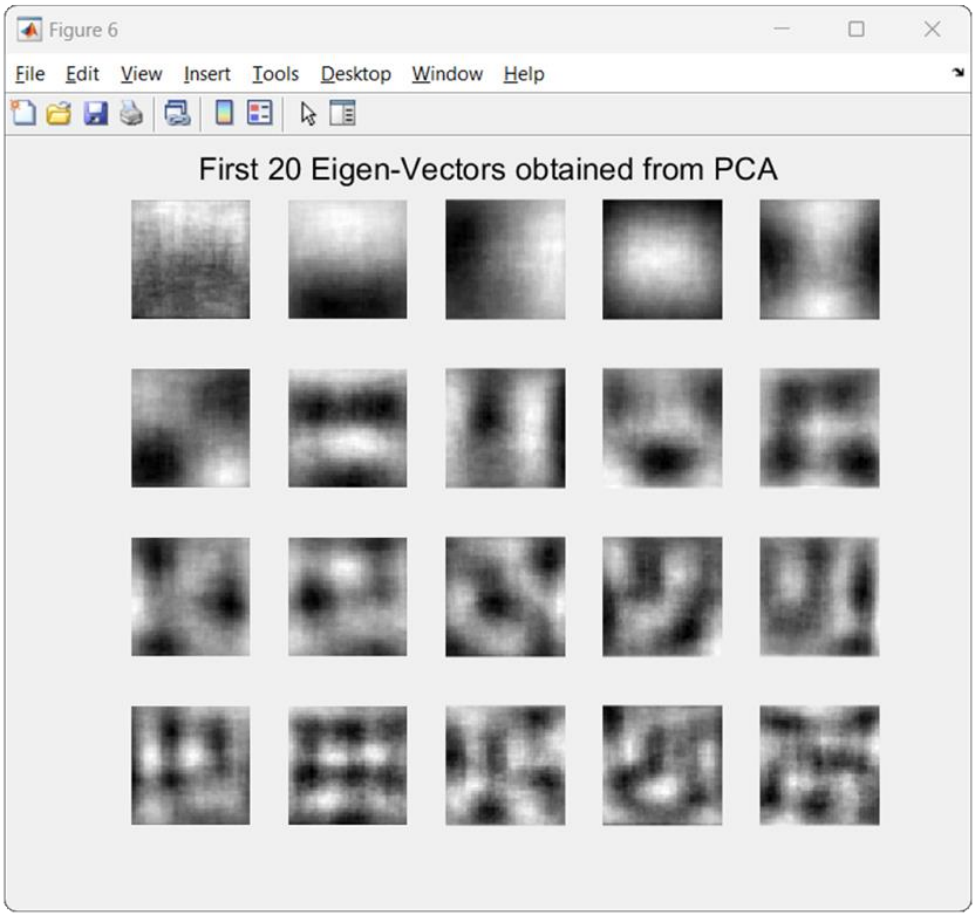
Visualization of first **20 Eigenvectors** obtained from **PCA**

CODE:

```
[PC, V] = pca(imageData);
PC = PC(:,1:20);

figure;

for i= 1:20
```

```
    subplot(4,5,i);
    temp = reshape(PC(:,i),[64 64]);
    imshow(temp,[]);

end

sgtitle('First 20 Eigen-Vectors obtained from PCA');
```

OUTPUT:



Problem (d)

Plotting **Test** images with most similar images in **Images** folder in **20 Dimension space**

CODE:

```
testpca=zeros(20,testlen);
```

```
testrecover=zeros(4096,testlen);

for i=1:testlen

    im_test= imread(strcat('.\places\Test\',testfiles(i).name));
    im_test= im2gray(im_test);
    im_test= im2double(im_test);
    im_test= imresize(im_test,[64,64]);
    im_test= im_test(:)';

    im_pca= im_test*PC;
    im_recover= im_pca*PC';
    im_recover= reshape(im_recover,[64 64]);
    im_pca=im_pca';
    testpca(:,i)=im_pca(:);
    testrecover(:,i)=im_recover(:);

end

imagespca=zeros(20,len);
imagesrecover=zeros(4096,len);

for i=1:len

    im_test= imread(strcat('.\places\Images\',imagefiles(i).name));
    im_test= im2gray(im_test);
    im_test= im2double(im_test);
    im_test= imresize(im_test,[64,64]);
    im_test= im_test(:)';

    im_pca= im_test*PC;
    im_recover= im_pca*PC';
    im_recover= reshape(im_recover,[64 64]);
```

```
    im_pca=im_pca';
    imagespca(:,i)=im_pca(:);
    imagesrecover(:,i)=im_recover(:);

end

for j=1:testlen

    distMat=zeros(1,len);

    for i=1:len
        dist=sqrt(sum((testpca(:,j)-imagespca(:,i)).^2));
        distMat(i)=dist;

    end
    minDist=min(distMat);
    minIndex=find(distMat==minDist);

    figure('Name','Using PCA');

    subplot(1,2,1);
    limg=imread(strcat('.\places\Test\',testfiles(j).name));
    imshow(limg);
    title(testfiles(j).name);

    subplot(1,2,2);
    rimg=strcat('.\places\Images\',imagefiles(minIndex).name);
    imshow(rimg);
    title(strcat('Match for',{' '},testfiles(j).name, ...
        {' '},':',{' '},imagefiles(minIndex).name));

    lpcimg=reshape(testrecover(:,j),[64,64]);
    rpcimg=reshape(imagesrecover(:,minIndex),[64,64]);
```

```
figure('Name','Principal Component Comparision');

subplot(1,2,1);
imshow(lpcimg,[])
title(strcat('PC of',{' '}, testfiles(j).name));

subplot(1,2,2);
imshow(rpcimg,[])
title(strcat('PC of',{' '},imagefiles(minIndex).name));

end
```

OUTPUT:

PC Comparison

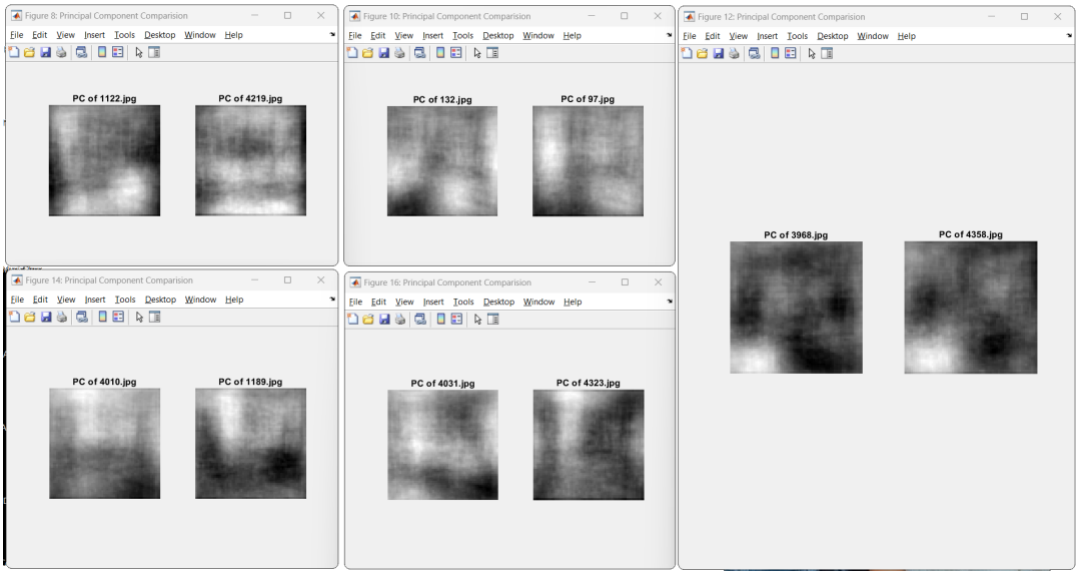
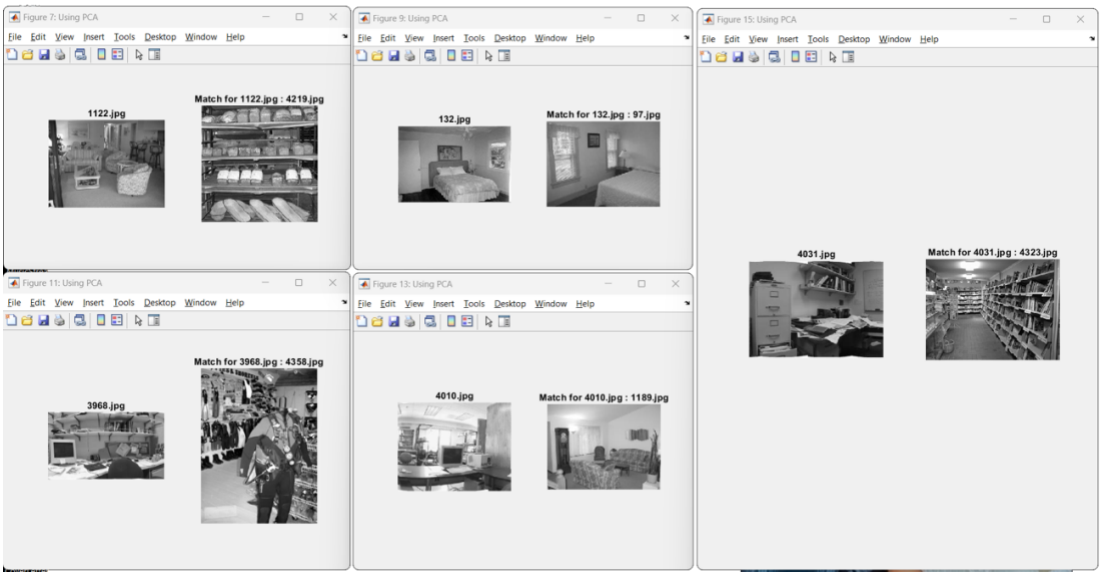


Image Comparison



Problem (e)

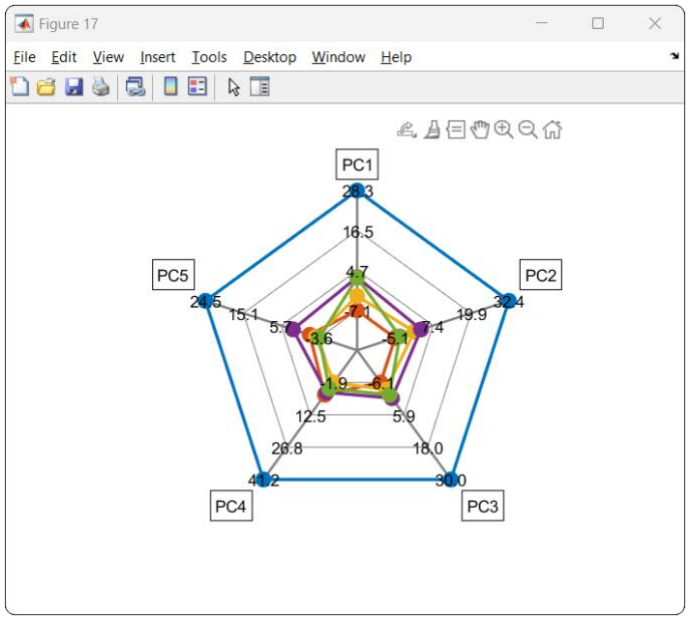
Visualization of **Test** images using **spider_plot()** function with firs**t 5 components**

CODE:

```
imagespca5=zeros(5,testlen);

for i=1:testlen

    im_test= imread(strcat('.\places\Test\',testfiles(i).name));
    im_test= im2gray(im_test);
    im_test= im2double(im_test);
    im_test= imresize(im_test,[64,64]);
    im_test= im_test(:)';

    im_pca= im_test*PC(:,1:5);
    im_pca=im_pca';
    imagespca5(:,i)=im_pca(:);

end

figure;
```

```
spider_plot(imagespca5,'AxesLabels',{'PC1','PC2','PC3','PC4','PC5'});
```

OUTPUT:



Issues Encountered:

- While accessing images with filenames in a series, there were missing filenames so, have accessed images through directory path.

Contribution of each individual member

Each of us solved all the problems.
Finally, all of us as a team discussed, analyzed and shared inputs on solution approaches for better results.