```
from google.colab import drive
drive.mount('/content/gdrive/')
%cd /content/gdrive/MyDrive/Machine Learning/LAB 3
!ls
```

```
Mounted at /content/gdrive/
/content/gdrive/MyDrive/Machine Learning/LAB 3
'Copy of ML.LS.3.19033.ipynb'   ML.PROJECT.ROUGH.ipynb   TrainCharacters
 ML.LS.3.19033.ipynb            TestCharacters
```

```
def gauss(x,m,c):
  w_1 = -0.5*(math.log(np.linalg.det(c),np.e))
  d=x.shape[0]
  u=x-m
  w1=np.linalg.inv(c)
  w_1_1 = -0.5*np.matmul(u.transpose(),np.matmul(w1,u))
  w_1_0 = -0.5*d*math.log(2*np.pi,np.e) + math.log(1/3.0,np.e)
  g = w_1+w_1_0+w_1_1
  return (g[0][0])
```

```
from google.colab.patches import cv2_imshow
import matplotlib.pyplot as plt
import matplotlib.image as mpimg
import glob
```

```
import math
import numpy as np
import cv2
from matplotlib import pyplot as plt

xi_max=255.0
lamda=0.5
I=np.identity(1024)

path1="/content/gdrive/MyDrive/Machine Learning/LAB 3/TrainCharacters/TrainCharacters/1/*.jpg"
path2="/content/gdrive/MyDrive/Machine Learning/LAB 3/TrainCharacters/TrainCharacters/2/*.jpg"

#x1=np.array([])
#x2=np.array([])
#A=np.array([])
s1 = np.zeros((1024,1024))
s2 = np.zeros((1024,1024))

Mu1=np.zeros((1024,1))
for i in glob.glob(path1):
     read_image1=cv2.imread(i,0)
     image_resize1=cv2.resize(read_image1,(32,32))
     reshaped1=np.reshape(image_resize1,(1024,1))
     norm1=reshaped1/xi_max
     #x1=np.append(x1,norm1)
     #A=np.append(A,norm1)
     Mu1=Mu1+norm1

Mu1=Mu1/(200)
```

```
Mu1=Mu1/(200)
print(Mu1.shape)
for i in glob.glob(path1):
     read_image1=cv2.imread(i,0)
     image_resize1=cv2.resize(read_image1,(32,32))
     reshaped1=np.reshape(image_resize1,(1024,1))
     norm1=reshaped1/xi_max
     s1+=np.dot((norm1-Mu1),((norm1-Mu1).T))
s1=s1+lamda*I


Mu2=np.zeros((1024,1))
for i in glob.glob(path2):
     read_image2=cv2.imread(i,0)
     image_resize2=cv2.resize(read_image2,(32,32))
     reshaped2=np.reshape(image_resize2,(1024,1))
     norm2=(reshaped2/xi_max)
     #x2=np.append(x2,norm2)
     #A=np.append(A,norm2)
     Mu2=Mu2+norm2
Mu2=Mu2/(200)
print(Mu2.shape)

for i in glob.glob(path2):
     read_image2=cv2.imread(i,0)
     image_resize2=cv2.resize(read_image2,(32,32))
     reshaped2=np.reshape(image_resize2,(1024,1))
     norm2=(reshaped2/xi_max)
     s2 += np.dot((norm2-Mu2),((norm2-Mu2).T))
s2=s2+lamda*I
```

```
(1024, 1)
(1024, 1)
```

```
S_W = s1+s2
#print(S_W,S_W.shape)
S_B= np.dot((Mu1-Mu2),((Mu1-Mu2).T))
#print(S_B,S_B.shape)
S_Winv = np.linalg.inv(S_W)
Y= np.dot(S_Winv,S_B)
(Y,Y.shape)
```

```
(array([[0., 0., 0., ..., 0., 0., 0.],
        [0., 0., 0., ..., 0., 0., 0.],
        [0., 0., 0., ..., 0., 0., 0.],
        ...,
        [0., 0., 0., ..., 0., 0., 0.],
        [0., 0., 0., ..., 0., 0., 0.],
        [0., 0., 0., ..., 0., 0., 0.]]), (1024, 1024))
```

```
w,v=np.linalg.eig(Y)
#print(w)
#print(v)
v=v.real
#w=w.real
index = w.argsort()[::-1]
```

```
    w=w[index]
    v=v[:,index]

    lek1=[]
    lek2=[]
    val=255.0
    for N in range(1,200,5):
        I=np.identity(N)
        project_array2=np.array([])
        project_array1=np.array([])
        for j in glob.glob(path1):
            read_image=cv2.imread(j,0)
            image_resize=cv2.resize(read_image,(32,32))
            norm=np.divide(image_resize,xi_max)
            x3=np.reshape(norm,(1024,1))
            z3=x3-Mu1
            for i in range(N):
                projection1=np.dot((v[:,i]).T,z3)
                project_array1=np.append(project_array1,projection1)
        project_array1=np.reshape(project_array1,(200,N))
        project_array1=project_array1.T
        Mu3=np.sum(project_array1,axis=1)
        mean1=np.reshape(Mu3,(N,1))
        for j in glob.glob(path2):
            read_image=cv2.imread(j,0)
            image_resize=cv2.resize(read_image,(32,32))
            norm=np.divide(image_resize,xi_max)
            x4=np.reshape(norm,(1024,1))
            z4=x4-Mu2
            for i in range(N):
                projection2=np.dot((v[:,i]).T,z4)
                project_array2=np.append(project_array2,projection2)
        project_array2=np.reshape(project_array2,(200,N))
        project_array2=project_array2.T
        Mu4=np.sum(project_array2,axis=1)
        mean2=np.reshape(Mu4,(N,1))
        Mu_pooled=(Mu3+Mu4)/400
        Mu_pooled=np.array(Mu_pooled)
        #s3=np.zeros((N,N))
        s3=0
        for i in range(200):
            s=project_array1[:,i]-Mu_pooled
            s3=s3+np.dot(s,s.T)
        for i in range(200):
           s=project_array2[:,i]-Mu_pooled
           s3=s3+np.dot(s,s.T)
        s3=s3/400
        s3=s3+lamda*I
        path3="/content/gdrive/MyDrive/Machine Learning/LAB 3/TestCharacters/TestCharacters/1/*.jpg"
        path4="/content/gdrive/MyDrive/Machine Learning/LAB 3/TestCharacters/TestCharacters/2/*.jpg"

        index1=0
        index2=0

        cnt1=0
        cnt2=0

        l1=[]
```

```
l2=[]

actual_label1=[]
actual_label2=[]

predicted_class_label1=[]
predicted_class_label2=[]

new_array1=np.zeros(100)
new_array2=np.zeros(100)

for j in glob.glob(path3):
    read_image=cv2.imread(j,0)
    image_resize=cv2.resize(read_image,(32,32))
    norm=np.divide(image_resize,xi_max)
    x4=np.reshape(norm,(1024,1))
    z5=x4-Mu1
    project_array3=np.array([])
    for i in range(N):
        projection3=np.dot((v[:,i]).T,z5)
        project_array3=np.append(project_array3,projection3)
    arr1=[0,0]
    arr1[0]=gauss(project_array3,mean1,s3)
    arr1[1]=gauss(project_array3,mean2,s3)
    max1=max(arr1)
    for i in range(2):
          if (max1==arr1[i]):
             new_array1[index1]=i+1
             if (new_array1[index1]==1):
                  cnt1=cnt1+1
             else:
                  l1.append(j)
                  actual_label1.append(1)
                  predicted_class_label1.append(i+1)
    index1=index1+1
#print("Accuracy1=",cnt1)
lek1.append(cnt1)
for j in glob.glob(path4):
  read_image=cv2.imread(j,0)
  image_resize=cv2.resize(read_image,(32,32))
  norm=np.divide(image_resize,val)
  x7=np.reshape(norm,(1024,1))
  z7=x7-Mu2
  project_array6=np.array([])
  for k in range(N):
      projection6=np.dot((v[:,k]).T,z7)
      project_array6=np.append(project_array6,projection6)
  arr2=np.zeros(2)
  arr2[0]=gauss(project_array6,mean1,s3)
  arr2[1]=gauss(project_array6,mean2,s3)
  max2=np.max(arr2)
  for i in range(2):
       if (max2==arr2[i]):
           new_array2[index2]=i+1
           if (new_array2[index2]==2):
                cnt2=cnt2+1
           else:
                l2.append(j)
```

```
                    actual_label2.append(2)
                    predicted_class_label2.append(i+1)
      index2=index2+1
    #print("Accuracy2=",cnt2)
    lek2.append(cnt2)


print("Accuracy of Class 1 : ",lek1)
print("Accuracy of Class 2 : ",lek2)
```

```
Accuracy of Class 1 :  [53, 54, 58, 57, 67, 79, 71, 83, 81, 84, 96, 94, 89, 98, 95, 9
Accuracy of Class 2 :  [50, 51, 58, 60, 63, 76, 82, 87, 87, 83, 91, 93, 98, 95, 96, 9
```

```
avac=[]
for i in range(len(lek1)):
  p=lek1[i]+lek2[i]
  p=p/2
  avac.append(p)
print("Accuracy of Class 1 : ",lek1)
print("Accuracy of Class 2 : ",lek2)
print("Average Accuracy :",avac)
```

```
Accuracy of Class 1 :  [53, 54, 58, 57, 67, 79, 71, 83, 81, 84, 96, 94, 89, 98, 95, 9
Accuracy of Class 2 :  [50, 51, 58, 60, 63, 76, 82, 87, 87, 83, 91, 93, 98, 95, 96, 9
Average Accuracy : [51.5, 52.5, 58.0, 58.5, 65.0, 77.5, 76.5, 85.0, 84.0, 83.5, 93.5,
```

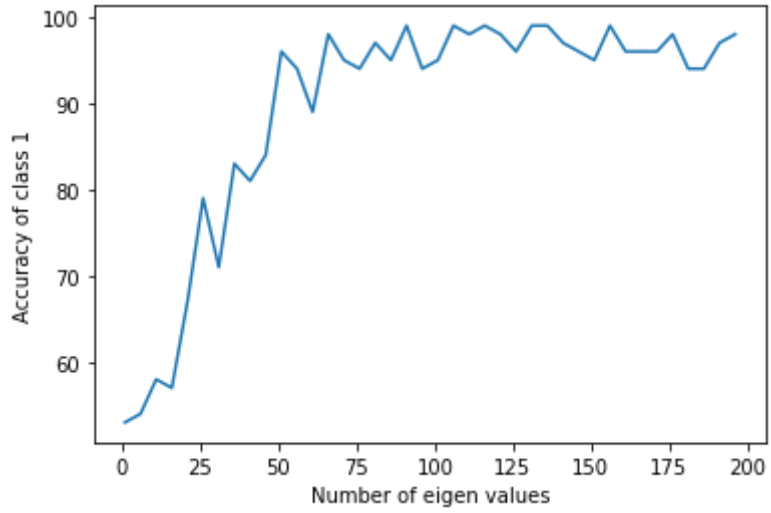
```
print("Accuracy1 = 89")
print("Accuracy1 = 94")
print("Average Accuracy = 81.5")
```

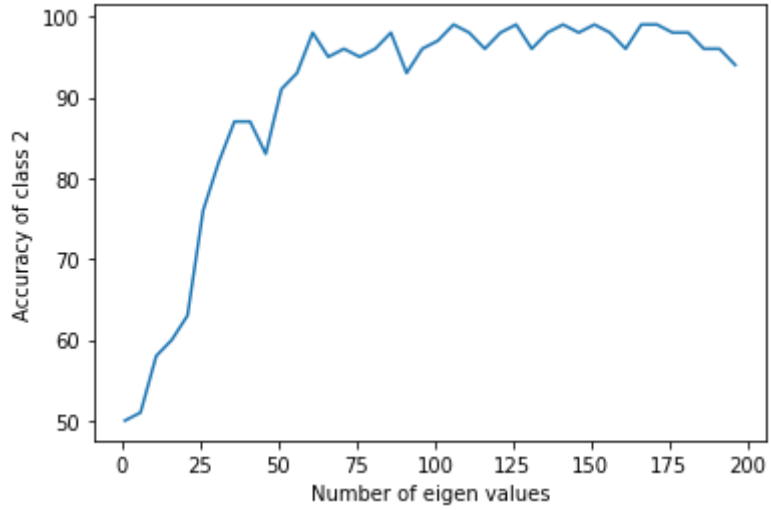
```
Accuracy1 = 89
Accuracy1 = 94
Average Accuracy = 81.5
```

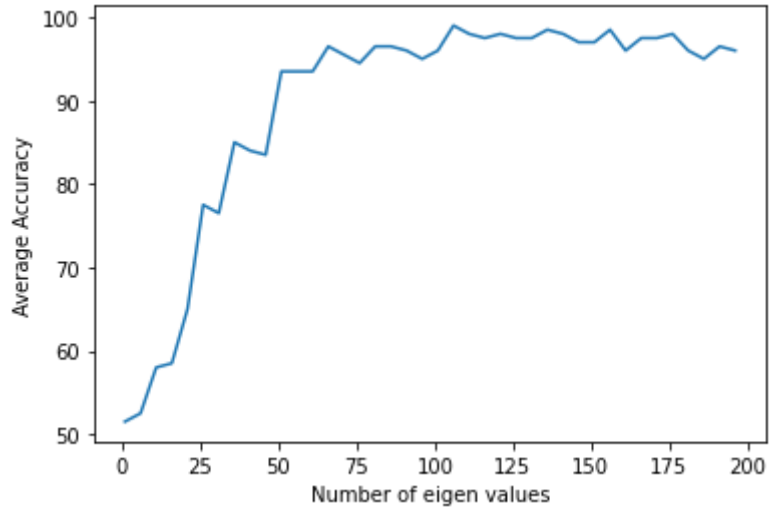
```
import matplotlib.pyplot as plt

x=np.arange(1,200,5)
plt.figure(1)
plt.xlabel("Number of eigen values")
plt.ylabel("Accuracy of class 1")
plt.plot(x,lek1)
plt.figure(2)
plt.xlabel("Number of eigen values")
plt.ylabel("Accuracy of class 2")
plt.plot(x,lek2)
```

```
plt.figure(3)
plt.xlabel("Number of eigen values")
plt.ylabel("Average Accuracy")
plt.plot(x,avac)
```

```
[<matplotlib.lines.Line2D at 0x7f5885938250>]
```








```
from google.colab.patches import cv2_imshow

newimage1=cv2.imread(l1[0],cv2.IMREAD_UNCHANGED)
cv2_imshow(newimage1)
print("Actual Label:",actual_label1[0])
```

```
print("Predicted Label:",predicted_class_label1[0])

newimage2=cv2.imread(l1[1],cv2.IMREAD_UNCHANGED)
cv2_imshow(newimage2)
print("Actual Label:",actual_label1[1])
print("Predicted Label:",predicted_class_label1[1])

newimage3=cv2.imread(l2[0],cv2.IMREAD_UNCHANGED)
cv2_imshow(newimage3)
print("Actual Label:",actual_label2[0])
print("Predicted Label:",predicted_class_label2[0])

newimage4=cv2.imread(l2[1],cv2.IMREAD_UNCHANGED)
cv2_imshow(newimage4)
print("Actual Label:",actual_label2[1])
print("Predicted Label:",predicted_class_label2[1])

newimage2=cv2.imread(l1[3],cv2.IMREAD_UNCHANGED)
cv2_imshow(newimage2)
print("Actual Label:",actual_label1[3])
print("Predicted Label:",predicted_class_label1[3])

newimage4=cv2.imread(l2[3],cv2.IMREAD_UNCHANGED)
cv2_imshow(newimage4)
print("Actual Label:",actual_label2[3])
print("Predicted Label:",predicted_class_label2[3])
```

```
Actual Label: 1
Predicted Label: 2
```

```
Actual Label: 1
Predicted Label: 2
```

```
Actual Label: 2
```

```
lek1=[]
lek2=[]
val=255.0
for N in range(1,200,5):
    I=np.identity(N)
    project_array2=np.array([])
    project_array1=np.array([])
    for j in glob.glob(path1):
        read_image=cv2.imread(j,0)
        image_resize=cv2.resize(read_image,(32,32))
        norm=np.divide(image_resize,xi_max)
        x3=np.reshape(norm,(1024,1))
        z3=x3-Mu1
        for i in range(N):
            projection1=np.dot((v[:,i]).T,z3)
            project_array1=np.append(project_array1,projection1)
    project_array1=np.reshape(project_array1,(200,N))
    project_array1=project_array1.T
    Mu3=np.sum(project_array1,axis=1)
    mean1=np.reshape(Mu3,(N,1))
    for j in glob.glob(path2):
        read_image=cv2.imread(j,0)
        image_resize=cv2.resize(read_image,(32,32))
        norm=np.divide(image_resize,xi_max)
        x4=np.reshape(norm,(1024,1))
        z4=x4-Mu2
        for i in range(N):
            projection2=np.dot((v[:,i]).T,z4)
            project_array2=np.append(project_array2,projection2)
    project_array2=np.reshape(project_array2,(200,N))
```

```
project_array2=project_array2.T
Mu4=np.sum(project_array2,axis=1)
mean2=np.reshape(Mu4,(N,1))
Mu_pooled=(Mu3+Mu4)/400
Mu_pooled=np.array(Mu_pooled)
#s3=np.zeros((N,N))
s3=0
for i in range(200):
    s=project_array1[:,i]-Mu_pooled
    s3=s3+np.dot(s,s.T)
for i in range(200):
   s=project_array2[:,i]-Mu_pooled
   s3=s3+np.dot(s,s.T)
s3=s3/400
s3=s3+lamda*I
s4=s3*I
path3="/content/gdrive/MyDrive/Machine Learning/LAB 3/TestCharacters/TestCharacters/1/*.jpg"
path4="/content/gdrive/MyDrive/Machine Learning/LAB 3/TestCharacters/TestCharacters/2/*.jpg"

index1=0
index2=0

cnt1=0
cnt2=0

l1=[]
l2=[]

actual_label1=[]
actual_label2=[]

predicted_class_label1=[]
predicted_class_label2=[]

new_array1=np.zeros(100)
new_array2=np.zeros(100)

for j in glob.glob(path3):
    read_image=cv2.imread(j,0)
    image_resize=cv2.resize(read_image,(32,32))
    norm=np.divide(image_resize,xi_max)
    x4=np.reshape(norm,(1024,1))
    z5=x4-Mu1
    project_array3=np.array([])
    for i in range(N):
        projection3=np.dot((v[:,i]).T,z5)
        project_array3=np.append(project_array3,projection3)
    arr1=[0,0]
    arr1[0]=gauss(project_array3,mean1,s4)
    arr1[1]=gauss(project_array3,mean2,s4)
    max1=max(arr1)
    for i in range(2):
          if (max1==arr1[i]):
             new_array1[index1]=i+1
             if (new_array1[index1]==1):
                  cnt1=cnt1+1
             else:
                  l1.append(j)
```

```
                    actual_label1.append(1)
                    predicted_class_label1.append(i+1)
        index1=index1+1
    #print("Accuracy1=",cnt1)
    lek1.append(cnt1)
    for j in glob.glob(path4):
      read_image=cv2.imread(j,0)
      image_resize=cv2.resize(read_image,(32,32))
      norm=np.divide(image_resize,val)
      x7=np.reshape(norm,(1024,1))
      z7=x7-Mu2
      project_array6=np.array([])
      for k in range(N):
          projection6=np.dot((v[:,k]).T,z7)
          project_array6=np.append(project_array6,projection6)
      arr2=np.zeros(2)
      arr2[0]=gauss(project_array6,mean1,s4)
      arr2[1]=gauss(project_array6,mean2,s4)
      max2=np.max(arr2)
      for i in range(2):
             if (max2==arr2[i]):
                 new_array2[index2]=i+1
                 if (new_array2[index2]==2):
                      cnt2=cnt2+1
                 else:
                      l2.append(j)
                      actual_label2.append(2)
                      predicted_class_label2.append(i+1)
      index2=index2+1
    #print("Accuracy2=",cnt2)
    lek2.append(cnt2)


print("Accuracy of Class 1 : ",lek1)
print("Accuracy of Class 2 : ",lek2)
```

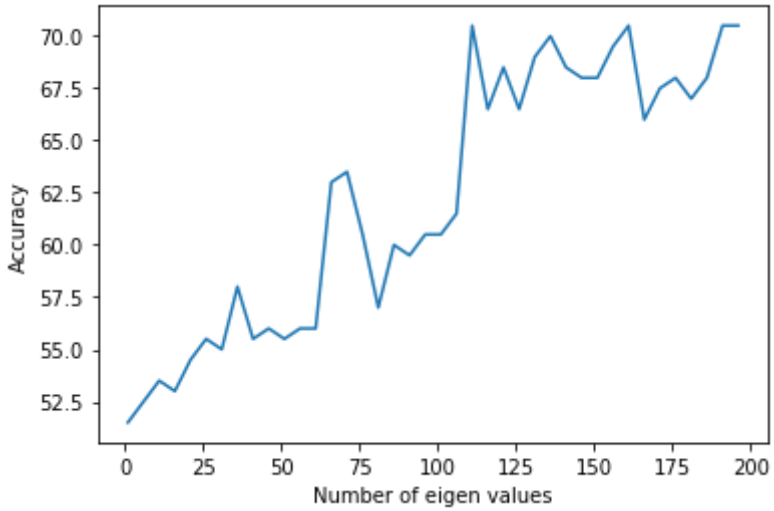
```
Accuracy of Class 1 :  [53, 54, 55, 54, 55, 57, 57, 58, 57, 57, 56, 59, 58, 65, 63, 6
Accuracy of Class 2 :  [50, 51, 52, 52, 54, 54, 53, 58, 54, 55, 55, 53, 54, 61, 64, 6
```

```
avac1=[]
for i in range(len(lek1)):
  p=lek1[i]+lek2[i]
  p=p/2
  avac1.append(p)
print("Accuracy of Class 1 : ",lek1)
print("Accuracy of Class 2 : ",lek2)
print("Average Accuracy : ",avac1)
```

```
Accuracy of Class 1 :  [53, 54, 55, 54, 55, 57, 57, 58, 57, 57, 56, 59, 58, 65, 63, 6
Accuracy of Class 2 :  [50, 51, 52, 52, 54, 54, 53, 58, 54, 55, 55, 53, 54, 61, 64, 6
Average Accuracy :  [51.5, 52.5, 53.5, 53.0, 54.5, 55.5, 55.0, 58.0, 55.5, 56.0, 55.5
```

```
import matplotlib.pyplot as plt

x=np.arange(1,200,5)
plt.figure(1)
plt.xlabel("Number of eigen values")
plt.ylabel("Accuracy")
plt.plot(x,avac1)
```

```
[<matplotlib.lines.Line2D at 0x7f5885abd590>]
```




```
from google.colab.patches import cv2_imshow

newimage1=cv2.imread(l1[0],cv2.IMREAD_UNCHANGED)
cv2_imshow(newimage1)
print("Actual Label:",actual_label1[0])
print("Predicted Label:",predicted_class_label1[0])

newimage2=cv2.imread(l1[1],cv2.IMREAD_UNCHANGED)
cv2_imshow(newimage2)
print("Actual Label:",actual_label1[1])
print("Predicted Label:",predicted_class_label1[1])

newimage3=cv2.imread(l2[0],cv2.IMREAD_UNCHANGED)
cv2_imshow(newimage3)
print("Actual Label:",actual_label2[0])
print("Predicted Label:",predicted_class_label2[0])

newimage4=cv2.imread(l2[1],cv2.IMREAD_UNCHANGED)
cv2_imshow(newimage4)
print("Actual Label:",actual_label2[1])
print("Predicted Label:",predicted_class_label2[1])
```

```
Actual Label: 1
Predicted Label: 2
```

```
Actual Label: 1
Predicted Label: 2
```

```
Actual Label: 2
Predicted Label: 1
```

```
lek1=[]
lek2=[]
val=255.0
for N in range(1,200,5):
    I=np.identity(N)
    project_array2=np.array([])
    project_array1=np.array([])
    for j in glob.glob(path1):
        read_image=cv2.imread(j,0)
        image_resize=cv2.resize(read_image,(32,32))
        norm=np.divide(image_resize,xi_max)
        x3=np.reshape(norm,(1024,1))
        z3=x3-Mu1
        for i in range(N):
            projection1=np.dot((v[:,i]).T,z3)
            project_array1=np.append(project_array1,projection1)
    project_array1=np.reshape(project_array1,(200,N))
    project_array1=project_array1.T
    Mu3=np.sum(project_array1,axis=1)
    mean1=np.reshape(Mu3,(N,1))
    for j in glob.glob(path2):
        read_image=cv2.imread(j,0)
        image_resize=cv2.resize(read_image,(32,32))
        norm=np.divide(image_resize,xi_max)
        x4=np.reshape(norm,(1024,1))
        z4=x4-Mu2
        for i in range(N):
            projection2=np.dot((v[:,i]).T,z4)
            project_array2=np.append(project_array2,projection2)
```

```
project_array2=np.reshape(project_array2,(200,N))
project_array2=project_array2.T
Mu4=np.sum(project_array2,axis=1)
mean2=np.reshape(Mu4,(N,1))
Mu_pooled=(Mu3+Mu4)/400
Mu_pooled=np.array(Mu_pooled)
#s3=np.zeros((N,N))
s3=0
for i in range(200):
    #s=project_array1[:,i]-Mu_pooled
    #s3=s3+np.dot(s,s.T)
    s3=np.var(s)
for i in range(200):
   s=project_array2[:,i]-Mu_pooled
   #s3=s3+np.dot(s,s.T)
   s3=np.var(s)
s3=s3/400
s3=s3+lamda*I
s5=s3*I
path3="/content/gdrive/MyDrive/Machine Learning/LAB 3/TestCharacters/TestCharacters/1/*.jpg"
path4="/content/gdrive/MyDrive/Machine Learning/LAB 3/TestCharacters/TestCharacters/2/*.jpg"

index1=0
index2=0

cnt1=0
cnt2=0

l1=[]
l2=[]

actual_label1=[]
actual_label2=[]

predicted_class_label1=[]
predicted_class_label2=[]

new_array1=np.zeros(100)
new_array2=np.zeros(100)

for j in glob.glob(path3):
    read_image=cv2.imread(j,0)
    image_resize=cv2.resize(read_image,(32,32))
    norm=np.divide(image_resize,xi_max)
    x4=np.reshape(norm,(1024,1))
    z5=x4-Mu1
    project_array3=np.array([])
    for i in range(N):
        projection3=np.dot((v[:,i]).T,z5)
        project_array3=np.append(project_array3,projection3)
    arr1=[0,0]
    arr1[0]=gauss(project_array3,mean1,s5)
    arr1[1]=gauss(project_array3,mean2,s5)
    max1=max(arr1)
    for i in range(2):
          if (max1==arr1[i]):
             new_array1[index1]=i+1
             if (new_array1[index1]==1):
```

```
                    cnt1=cnt1+1
                else:
                    l1.append(j)
                    actual_label1.append(1)
                    predicted_class_label1.append(i+1)
        index1=index1+1
    #print("Accuracy1=",cnt1)
    lek1.append(cnt1)
    for j in glob.glob(path4):
      read_image=cv2.imread(j,0)
      image_resize=cv2.resize(read_image,(32,32))
      norm=np.divide(image_resize,val)
      x7=np.reshape(norm,(1024,1))
      z7=x7-Mu2
      project_array6=np.array([])
      for k in range(N):
          projection6=np.dot((v[:,k]).T,z7)
          project_array6=np.append(project_array6,projection6)
      arr2=np.zeros(2)
      arr2[0]=gauss(project_array6,mean1,s5)
      arr2[1]=gauss(project_array6,mean2,s5)
      max2=np.max(arr2)
      for i in range(2):
             if (max2==arr2[i]):
                 new_array2[index2]=i+1
                 if (new_array2[index2]==2):
                     cnt2=cnt2+1
                 else:
                     l2.append(j)
                     actual_label2.append(2)
                     predicted_class_label2.append(i+1)
      index2=index2+1
    #print("Accuracy2=",cnt2)
    lek2.append(cnt2)


print("Accuracy of Class 1 : ",lek1)
print("Accuracy of Class 2 : ",lek2)
```

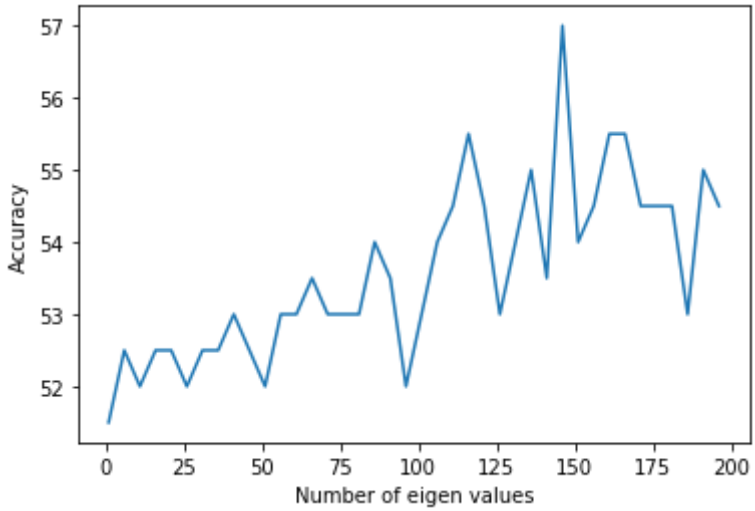
```
Accuracy of Class 1 :  [53, 54, 54, 54, 54, 53, 54, 55, 54, 54, 53, 55, 55, 56, 54, 5
Accuracy of Class 2 :  [50, 51, 50, 51, 51, 51, 51, 50, 52, 51, 51, 51, 51, 51, 52, 5
```

```
avac2=[]
for i in range(len(lek1)):
  p=lek1[i]+lek2[i]
  p=p/2
  avac2.append(p)
print(avac2)
```

```
[51.5, 52.5, 52.0, 52.5, 52.5, 52.0, 52.5, 52.5, 53.0, 52.5, 52.0, 53.0, 53.0, 53.5,
```

```
import matplotlib.pyplot as plt

x=np.arange(1,200,5)
plt.figure(1)
plt.xlabel("Number of eigen values")
plt.ylabel("Accuracy")
plt.plot(x,avac2)
```

```
[<matplotlib.lines.Line2D at 0x7f5885a00f90>]
```




```
from google.colab.patches import cv2_imshow

newimage1=cv2.imread(l1[0],cv2.IMREAD_UNCHANGED)
cv2_imshow(newimage1)
print("Actual Label:",actual_label1[0])
print("Predicted Label:",predicted_class_label1[0])

newimage2=cv2.imread(l1[1],cv2.IMREAD_UNCHANGED)
cv2_imshow(newimage2)
print("Actual Label:",actual_label1[1])
print("Predicted Label:",predicted_class_label1[1])

newimage3=cv2.imread(l2[0],cv2.IMREAD_UNCHANGED)
cv2_imshow(newimage3)
print("Actual Label:",actual_label2[0])
print("Predicted Label:",predicted_class_label2[0])

newimage4=cv2.imread(l2[1],cv2.IMREAD_UNCHANGED)
cv2_imshow(newimage4)
print("Actual Label:",actual_label2[1])
print("Predicted Label:",predicted_class_label2[1])
```

```
Actual Label: 1
Predicted Label: 2
```

```
Actual Label: 1
Predicted Label: 2
```

```
Actual Label: 2
Predicted Label: 1
```

```
Actual Label: 2
Predicted Label: 1
```

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