Project 2

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Task A –

At&T image with k =10 and k means with 100 images.

K means labels [2 2 2 2 2 2 2 2 2 9 9 9 9 9 9 9 9 9 9 1 1 1 1 0 1 1 1 1 1 7 7 7 7 7 7 7

7 7 7 0 0 0 0 0 0 0 0 0 0 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 8 8 8 8

8 8 8 8 8 8 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 8]

Confusion matrix is: [[0 0 0 0 0 0 0 0 0 0 0 0]

 [0 0 10 0 0 0 0 0 0 0 0 0]

 [0 0 0 0 0 0 0 0 0 0 10 0]

 [1 9 0 0 0 0 0 0 0 0 0 0]

 [0 0 0 0 0 0 0 0 10 0 0 0]

 [10 0 0 0 0 0 0 0 0 0 0 0]

 [0 0 0 0 10 0 0 0 0 0 0 0]

 [0 0 0 0 0 10 0 0 0 0 0 0]

 [0 0 0 0 0 0 0 0 0 10 0 0]

 [0 0 0 10 0 0 0 0 0 0 0 0] [0 0 0 0 0 0 9

0 1 0 0]] re ordered matrix [[10 1 0 0 0 0

0 0 0 0 0]

 [0 9 0 0 0 0 0 0 0 0 0]

 [0 0 10 0 0 0 0 0 0 0 0]

 [0 0 0 10 0 0 0 0 0 0 0]

 [0 0 0 0 10 0 0 0 0 0 0]

 [0 0 0 0 0 10 0 0 0 0 0]

 [0 0 0 0 0 0 9 0 0 0 0]

[0 0 0 0 0 0 0 10 0 0 0 0]

[0 0 0 0 0 0 1 0 10 0 0 0]

[0 0 0 0 0 0 0 0 0 0 10 0]

[0 0 0 0 0 0 0 0 0 0 0 0]]

accuracy of k means is: 98.0

Task – B

please enter the file name if file does not exist in the directory program exists please give full path:
ATNTFaceImages400.txt
enter value of k: 40
K means labels [6 15 24 39 39 39 39 39 39 20 24 24 24 24 24 24 24 24 24 24 1 1 1 32
 14 1 1 1 1 1 32 32 32 32 25 32 32 32 32 25 14 14 14 14 17 17 14 17
 17 17 9 9 9 9 9 9 9 9 9 9 11 11 11 11 11 11 11 11 11 11 12 12
 12 12 12 12 12 12 12 12 1 1 1 1 25 1 1 1 1 25 34 34 34 34 34 34
 34 34 34 12 31 31 31 16 16 31 31 31 31 31 33 33 33 33 33 33 33 33 33 33
 15 15 15 15 15 15 15 15 15 15 21 21 21 21 21 21 21 21 21 21 29 26 29 29
 26 29 26 29 26 26 29 6 6 36 36 29 6 6 6 6 20 20 1 1 20 30 30 30
 30 30 15 15 17 15 17 17 15 17 17 17 22 22 22 16 16 22 16 16 16 22 18 18
 18 18 25 18 25 25 25 18 19 19 19 19 19 19 19 19 19 19 8 8 8 8 8 8
  8 8 8 8 4 25 4 4 4 4 4 25 4 4 29 29 28 28 29 29 29 29 28 28
 32 32 32 14 14 32 32 14 32 32 35 35 35 35 35 35 0 35 35 35 22 22 22 22
 22 6 31 6 6 22 0 10 0 10 10 0 10 13 20 0 2 2 2 18 18 18 18 18
  2 18 7 7 7 7 7 7 7 7 7 7 19 23 23 23 23 19 19 19 19 23 3 3
  3 3 3 3 24 3 3 3 2 2 2 2 2 19 2 2 2 2 37 37 37 37 37 37
 37 37 37 37 26 26 26 26 38 32 32 32 38 5 11 30 11 11 11 30 30 11 30 30
 13 10 13 10 10 10 13 10 13 13 4 4 4 1 4 4 4 4 4 4 27 27 8 8
 27 8 27 27 27 27 5 5 5 14 17 5 17 5 17 14]
Confusion matrix is: [[0 0 0 ... 0 0 0]
 [0 0 0 ... 0 6 0]
 [0 0 0 ... 0 0 0]
 ...
 [0 1 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]]
re ordered matrix [[4 0 0 ... 0 0 0]
 [0 8 0 ... 0 0 8]
 [0 0 9 ... 0 0 0]
 ...
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 6 0]

[0 0 0 ... 0 0 0]]
accuracy of k means is: 67.5

Task – C

please enter the file name if file does not exist in the directory program exists please give full path: HandWrittenLetters.txt enter value of k: 26

K means labels [11 11 11 ... 5 7 5]

Confusion matrix is: [[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 1 1 2 0 0 0 3 0 0 15 0 6 0 0 0 1 0 7 0 0 0 1

   0 2 0]

 [22 1 0 2 0 0 4 0 2 0 0 1 0 0 0 0 0 1 0 0 5 0 0

   0 1 0]

 [0 31 0 0 0 0 6 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0

   0 0 0]

 [1 0 0 0 1 6 1 1 0 6 13 0 0 0 0 0 0 0 0 1 0 7 1 0

   0 1 0]

 [0 3 0 0 1 0 4 2 0 0 0 0 0 0 0 0 0 0 29 0 0 0 0 0

   0 0 0]

 [0 0 0 0 11 0 0 0 11 0 0 1 0 13 0 0 0 1 1 0 0 0 0 1

   0 0 0]

 [1 5 0 0 1 0 2 0 0 2 1 0 0 0 0 1 0 3 1 0 0 1 0 5

0 16 0]

[0 0 10 1 0 0 1 0 0 0 0 3 0 0 0 1 0 0 0 13 0 0 0 9
  1 0 0]

[0 0 0 0 0 18 1 0 0 0 0 0 0 0 0 15 0 0 1 1 3 0 0
  0 0 0]

[0 0 0 0 0 2 0 0 0 0 1 0 0 0 0 0 20 0 0 0 0 16 0 0
  0 0 0]

[0 0 0 23 0 0 0 0 0 0 2 0 0 1 0 0 8 0 0 2 0 3 0
  0 0 0]

[0 0 0 2 3 0 7 2 0 0 0 0 0 0 0 0 0 0 0 0 0 25 0
  0 0 0]

[0 0 26 0 0 0 0 0 0 1 0 3 1 0 0 0 0 1 0 6 0 0 0 1
  0 0 0]

[0 0 12 0 0 0 0 0 0 1 0 4 15 0 0 2 0 1 0 3 0 0 1 0
  0 0 0]

[0 3 0 0 0 0 3 0 0 10 23 0 0 0 0 0 0 0 0 0 0 0 0 0
  0 0 0]

[0 0 0 0 2 0 0 0 17 5 0 5 0 7 0 1 0 0 0 0 0 0 0 0
  0 2 0]

[0 2 0 0 0 0 0 0 1 5 2 0 0 0 0 0 1 0 0 0 0 0 2
  0 26 0]

[0 0 0 17 0 0 2 3 6 0 0 3 0 0 0 1 0 1 2 0 0 0 1 0
  0 3 0]

[22 2 0 0 0 0 2 0 0 1 0 0 0 0 0 0 1 0 1 0 0 10 0 0

```
   0 0 0]
 [ 0 3 0 0 6 6 0 0 0 0 0 1 0 0 0 1 13 8 0 0 0 0 0 1  0 0 0]
 [ 0 0 0 2 0 0 0 0 0 5 0 0 0 0 2 1 0 0 0 0 0 0 1 1
  25 2 0]
 [ 0 0 0 0 0 0 0 0 0 0 0 0 1 0 23 9 0 1 0 0 0 0 0 2
   3 0 0]
 [ 0 0 0 1 0 0 0 0 0 0 0 0 22 0 1 3 0 0 0 1 1 0 2 3
   5 0 0]
 [ 0 0 0 3 3 0 0 0 0 0 1 0 1 0 1 0 2 0 0 28 0 0 0
    0 0 0]
 [ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 21 0 6 0 0 6 0 0 6
    0 0 0]
 [ 0 0 0 0 0 6 2 28 0 0 0 0 0 0 0 2 0 0 0 0 0 1 0
    0 0 0]]
```
re ordered matrix [[22 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 22 0 1
   0 0 0]
 [1 31 0 0 0 0 0 0 0 0 3 0 0 0 0 0 0 3 3 0 0 2 0 5
   0 2 0]
 [0 0 26 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 10 0 0 0 0
  0 0 12]
 [2 0 0 23 0 0 17 0 0 0 0 1 1 0 0 0 0 0 1 3 0 2 0
   2 0 0]
 [0 0 0 0 0 0 0 0 2 1 0 2 0 11 0 0 0 6 1 0 3 0 3 1
```

0 0 0]

[ 0 0 0 0 0 18 0 6 0 6 0 0 0 0 0 2 6 0 0 0 0 0 0
  0 0 0]

[ 4 6 0 0 0 1 2 2 0 1 3 0 0 0 0 0 0 4 1 0 2 7 2
  0 0 0]

[ 0 0 0 0 0 0 3 28 0 1 0 0 0 0 0 0 0 2 0 0 0 2 0
  0 0 0]

[ 2 0 0 0 0 6 0 17 0 0 3 0 11 0 0 0 0 0 0 0 0 0 0
  0 1 0]

[ 0 1 1 0 0 0 0 0 5 6 10 0 0 0 0 0 0 0 0 0 0 1 0 2
  5 5 1]

[ 0 1 0 0 0 0 0 0 0 13 23 0 0 0 0 0 1 0 0 0 0 0 1
  0 2 0]

[ 1 0 3 2 0 0 3 0 5 0 0 15 0 1 0 0 0 1 0 3 1 0 0
  0 0 4]

[ 0 0 1 0 0 0 0 0 0 0 0 0 22 0 1 0 0 0 0 0 0 0 0
  0 0 15]

[ 0 0 0 0 0 0 0 0 7 0 0 6 0 13 0 0 0 0 0 0 1 0 0 0
  0 0 0]

[ 0 0 0 1 0 0 0 0 0 0 0 0 1 0 23 0 0 0 0 0 0 0 0 0
  2 0 0]

[ 0 0 0 0 0 0 1 0 1 0 0 0 3 0 9 21 0 1 0 1 1 0 0 1
  1 0 2]

[ 0 0 0 0 0 15 0 2 0 0 0 0 0 0 0 0 20 13 0 0 0 1 0 0

```
  0 0 0]
 [0 0 1 8 0 0 1 0 0 0 0 1 0 1 1 6 0 8 0 0 2 0 0 3
  0 1 1]
 [1 0 0 0 0 0 2 0 0 0 0 0 0 1 0 0 0 29 0 0 1 0 1
  0 0 0]
 [0 0 6 0 0 1 0 0 0 1 0 7 1 0 0 0 0 0 0 13 0 0 0 0
  0 0 3]
 [0 0 0 2 0 1 0 0 0 0 0 0 1 0 0 6 0 0 0 0 28 0 0 0
  0 0 0]
 [5 0 0 0 0 3 0 0 0 7 0 0 0 0 0 0 16 0 0 0 0 10 0 1
 0 0 0]
 [0 0 0 3 0 0 1 1 0 1 0 0 2 0 0 0 0 0 0 0 0 0 25 0
 1 0 1]
 [0 0 1 0 0 0 0 0 0 0 0 0 1 3 1 2 6 0 1 0 9 0 0 0 5
  1 2 0]
 [0 0 0 0 0 0 0 0 0 0 0 0 0 5 0 3 0 0 0 0 1 0 0 0 0
  25 0 0]
 [1 0 0 0 0 0 3 0 2 1 0 2 0 0 0 0 0 0 0 0 0 0 0 0 16
  2 26 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]]
```
accuracy of k means is: 47.23865877712032