Computer Vision
Jacobs University Bremen
Dragi Kamov

Course: CO22-320671
December 9th, 2018

Homework 4

Problem 1

Solution:

I have two panoramas in my solution, one of which is with the black spaces where the panorama was missing parts(*pano_uncut.jpg*) and one which was cropped from that one to look perfect as a panorama(*pano_cut.jpg*).

Problem 2

Solution:

a) Check the resulting gif in the directory called *a.gif*. For more details enter the directory *a* and there will be all the *jpg*s used for creating the *gif*. Also, the code for solving the problem is going to be in the mentioned MatLab file from the problem sheet.

b) Check the resulting gif in the directory called *b.gif*. For more details enter the directory *b* and there will be all the *jpg*s used for creating the *gif*. Also, the code for solving the problem is going to be in the mentioned MatLab file from the problem sheet.

c) At the beginning some parts are hidden and then they become visible and those parts through the transitions are blurry because those are missing information.

d) The code for solving the problem is going to be in the mentioned MatLab file from the problem sheet.

e) Check the resulting gif in the directory called *e.gif*. For more details enter the directory *e* and there will be all the *jpg*s used for creating the *gif*. Also, the code for solving the problem is going to be in the mentioned MatLab file from the problem sheet.

Problem 3

Solution:

a) At first we randomly split the points into two clusters:
Cluster 1: X2
Cluster 2: X1, X3, X4
Then we compute the center of each cluster with the following formula:

$$C_i = \frac{1}{n}\sum_{i=1}^{n} a_i$$

So for cluster 1:

$$C_1 = \frac{(0,9)}{1} = (0, 9)$$

And for cluster 2:

$$C_2 = \frac{(0-4+4,16-0+0)}{3} = (0, 5.33)$$

Now we need to find the midpoint between the centers of the two clusters and that can be found through the mean:

$$m = \frac{(0+0,9+5.33)}{2} = (0, 8.165)$$

And from this we can see that $y = 8.165$. All points from $y = 8.165$ and above belong to cluster 1, and the points bellow $y = 8.165$ belong to cluster 2.

b) Now, we need to calculate the sum of all the distances:

$$\sum_{i=1}^{m} d(x^i, \mu_{li}) = d(X_1, C_1) + d(X_2, C_2) + d(X_3, C_3) + d(X_4, C_4) = 10.67 + 0 + 6.66 + 6.66 = 23.99$$

There is another way to solve this in order to minimize the sum and that is if we group X1 and X2 in one cluster and X3 and X4 in another. And that would look like this:

$$C_1 = \frac{(0+0,16+9)}{2} = (0, 12.5)$$
$$C_2 = \frac{(-4+4,0+0)}{2} = (0, 0)$$

And then the sum of the distances will be the following:

$$\sum_{i=1}^{m} d(x^i, \mu_{li}) = d(X_1, C_1) + d(X_2, C_2) + d(X_3, C_3) + d(X_4, C_4) = 3.5 + 3.5 + 4 + 4 = 15$$

And the midpoint between the two clusters would be:

$$m = \frac{(0+0,12.5+0)}{2} = (0, 6.25)$$