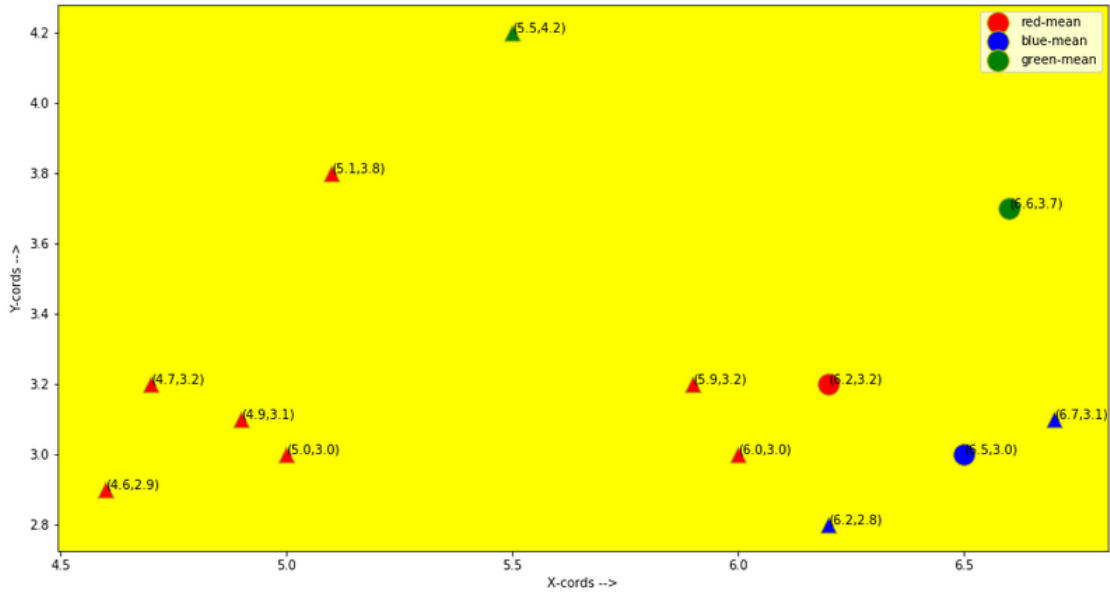


Task-2 K-Mean clustering

Part-1 :

a. The following image represents **task2_iter1_a.jpg** :



The classification vector is as follows:

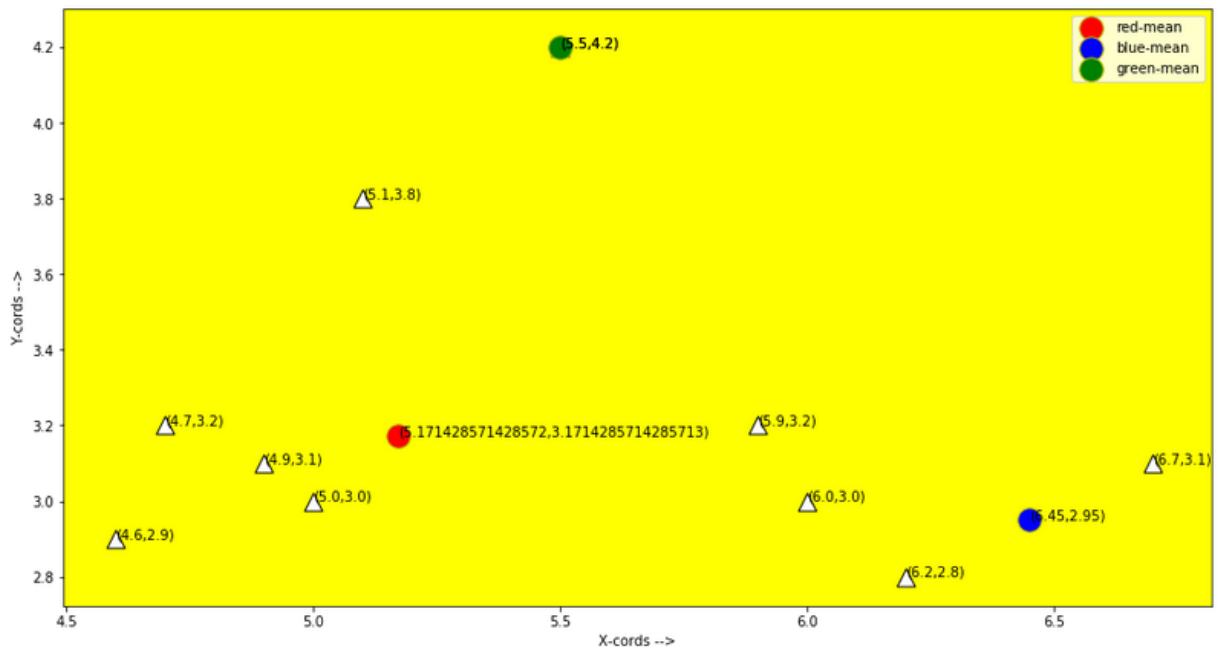
coordinates	Cluster
[5.9,3.2]	0
[4.6, 2.9]	0
[6.2,2.8]	2
[4.7,3.2]	0
[5.5,4.2]	1
[5.0,3.0]	0
[4.9,3.1]	0
[6.7,3.1]	2
[5.1,3.8]	0
[6.0,3.0]	0

For red color: centroid: (6.2, 3.2)

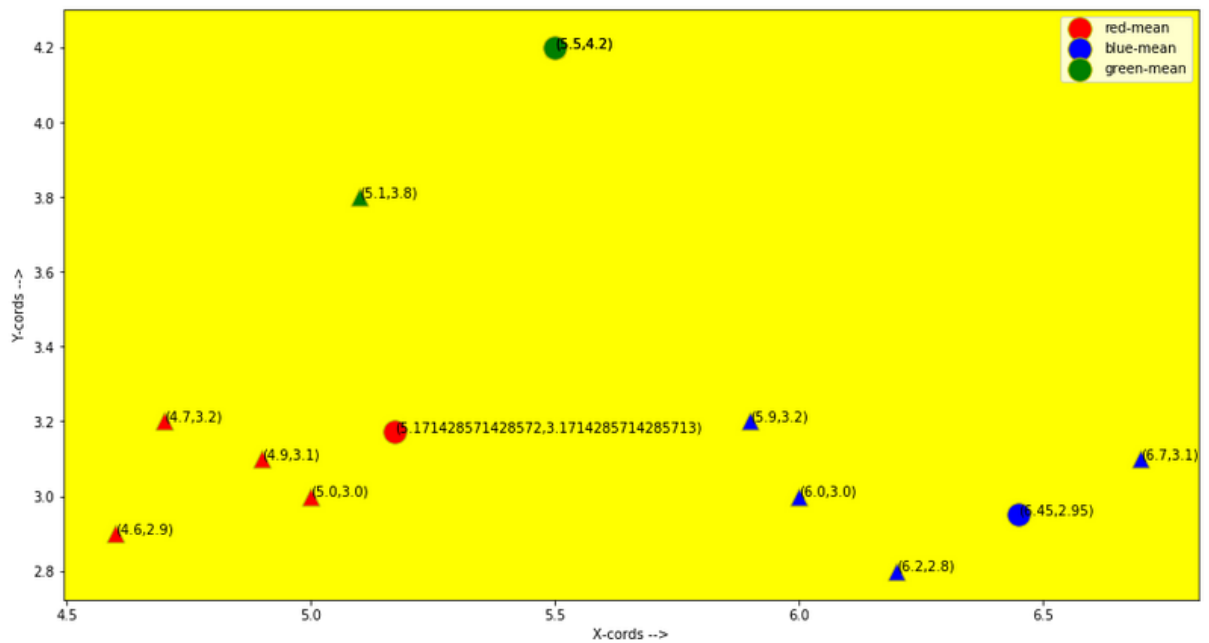
For Green color: centroid: (6.6,3.7)

For Blue: centroid: (6.5, 3.0)

b. The following image represents **task2_iter1_b.jpg**:



c. The following image represents **task2_iter2_a.jpg**:



Coordinate's	Cluster
[5.9,3.2]	2
[4.6, 2.9]	0
[6.2,2.8]	2
[4.7,3.2]	0
[5.5,4.2]	1
[5.0,3.0]	0
[4.9,3.1]	0
[6.7,3.1]	2
[5.1,3.8]	1
[6.0,3.0]	2

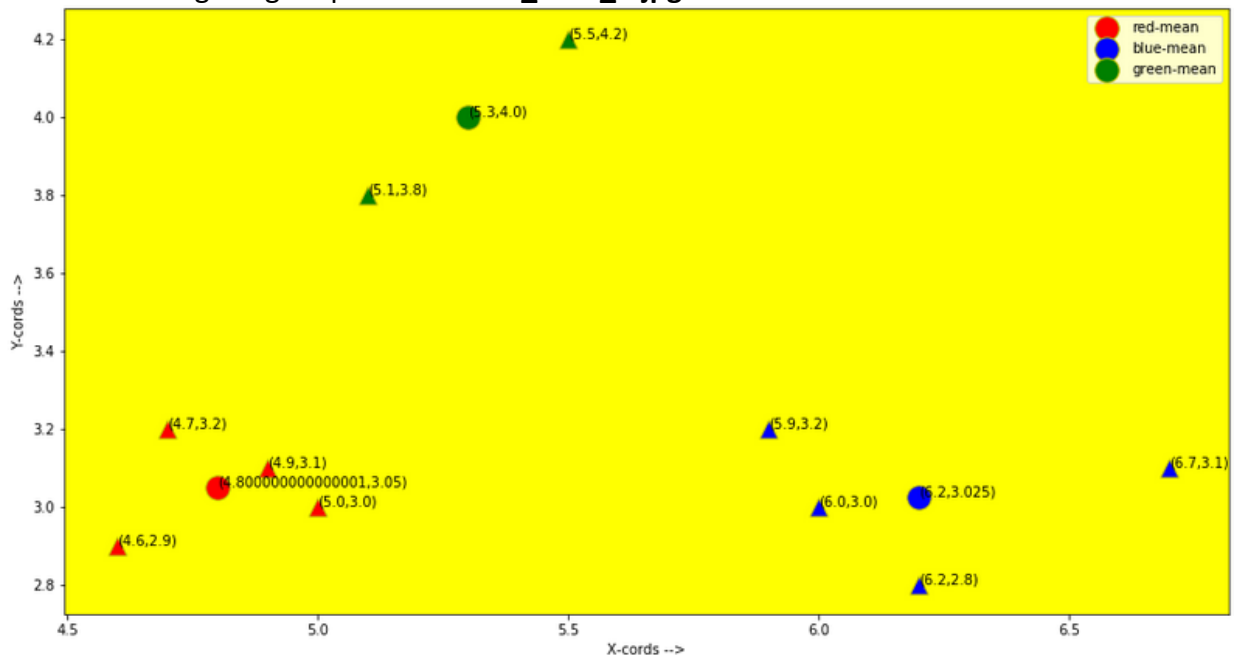
The classification vectors are as follows:

The centroid for red is: (5.17142857 3.17142857)

The centroid for green is (5.5,4.2)

The centroid for blue is: (6.45 2.95)

d. The following image represents **task2_iter2_b.jpg**:



coordinates	Cluster
[5.9,3.2]	2
[4.6, 2.9]	0
[6.2,2.8]	2
[4.7,3.2]	0
[5.5,4.2]	1
[5.0,3.0]	0
[4.9,3.1]	0
[6.7,3.1]	2
[5.1,3.8]	1
[6.0,3.0]	2

The centroid for red is: (4.8 3.05)

The centroid for green is: (5.3 4.)

The centroid for blue is: (6.2 3.025)

Part2-Image quantization:

((task2_baboon_3.jpg)



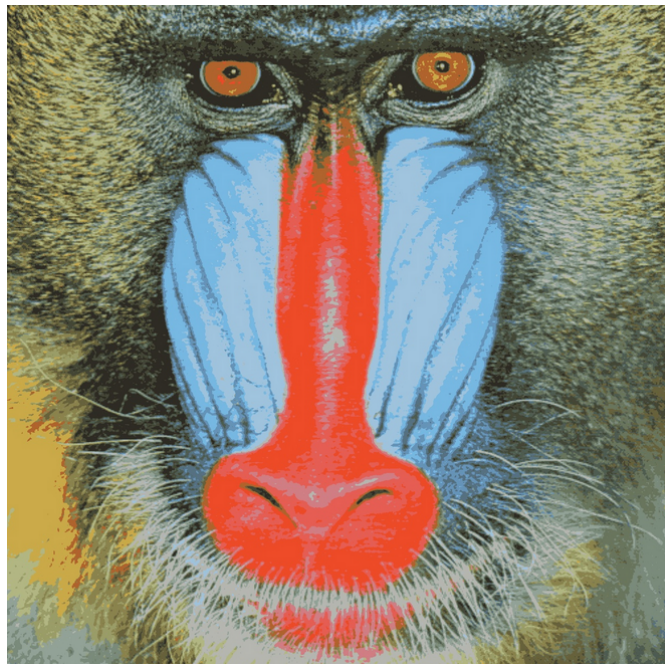
(task2_baboon_5.jpg)



(task2_baboon_10.jpg)



(task2_baboon_20.jpg)



Explanation:

Both given problems belong to K means clustering. The problems were sorted using the following series of steps:

1. K random centroids were chosen, where K is the number of required clusters)
2. The distance of each point was taken from these centroids and the points closest to a given cluster were assigned a cluster, thus we getting a total k clusters.
3. The mean of all points in every cluster was found and It was termed as new means.
4. Now step 1,2,3 were repeated and k-means were updated again
5. The iteration was repeated until the difference between old means and new means was 0 or really small.
6. The found k -means and updated k clusters were the output.

The above steps show how K-means work generally. For part 1 of task 2, we were given number of iterations to go through, so we didn't have to worry about making sure that old set of means are equal to new sets.

In part 2, ie color quantization, we had to first flatten and reshape the given image and convert it into a 2-d from 3-d. Then at the end, when we achieved k means and their corresponding clusters, then, every point's value in a given cluster was changed to that of the mean of that cluster.

Thus in various cases of k, we got k number of colors to represent the whole image and this process was termed as color quantization.