# CVIP Project 3

## Task2

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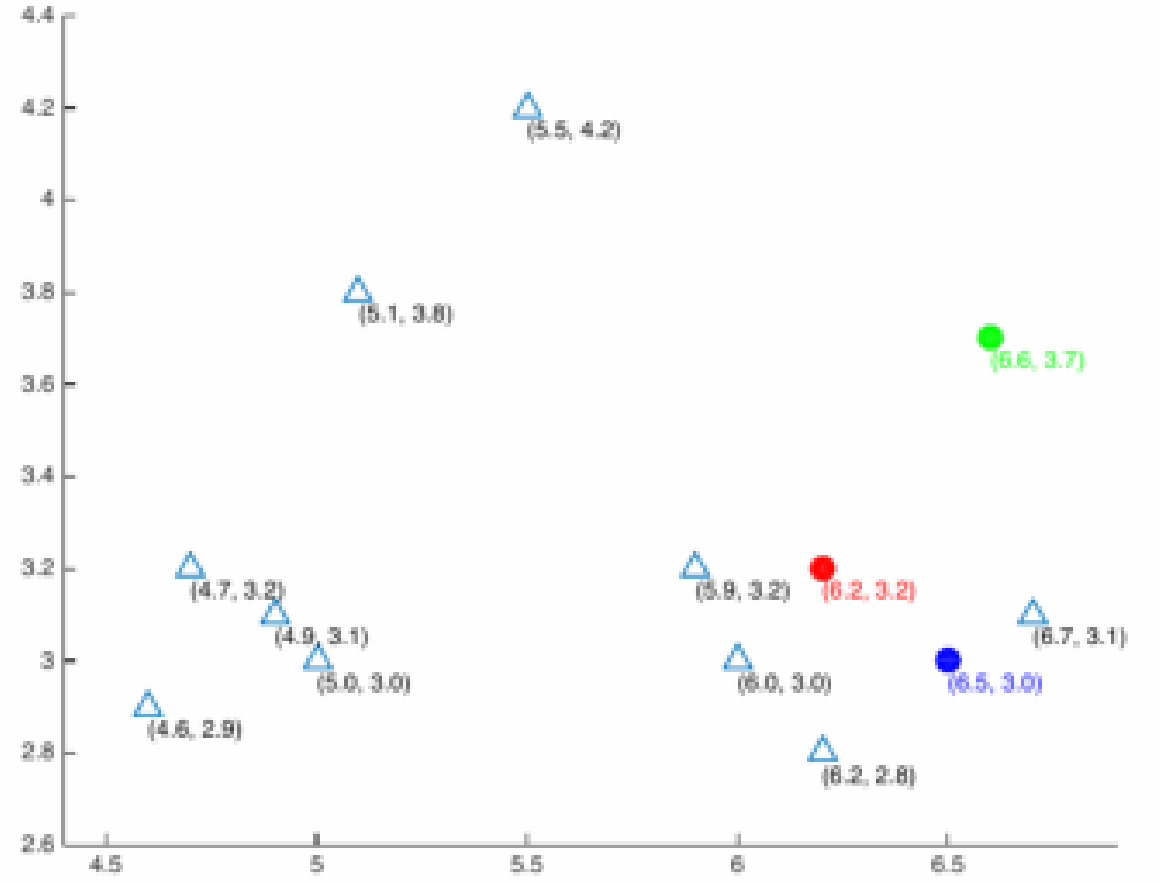
The task is to find the updated centroids for 2 iterations.

Given centroids.

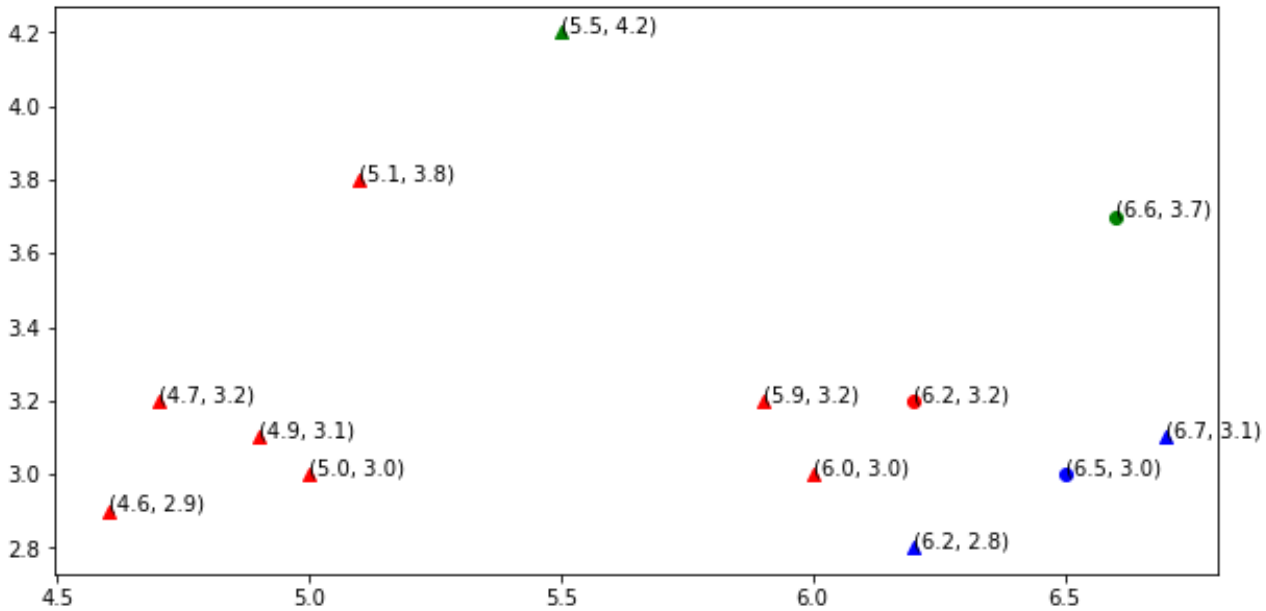
μ1 = (6.2, 3.2) (red), μ2 = (6.6, 3.7) (green), μ3 = (6.5, 3.0) (blue).



After computing k means in the first iteration, the following is the clustering plot.('task2_iter1_a.jpg')

Classification of data:

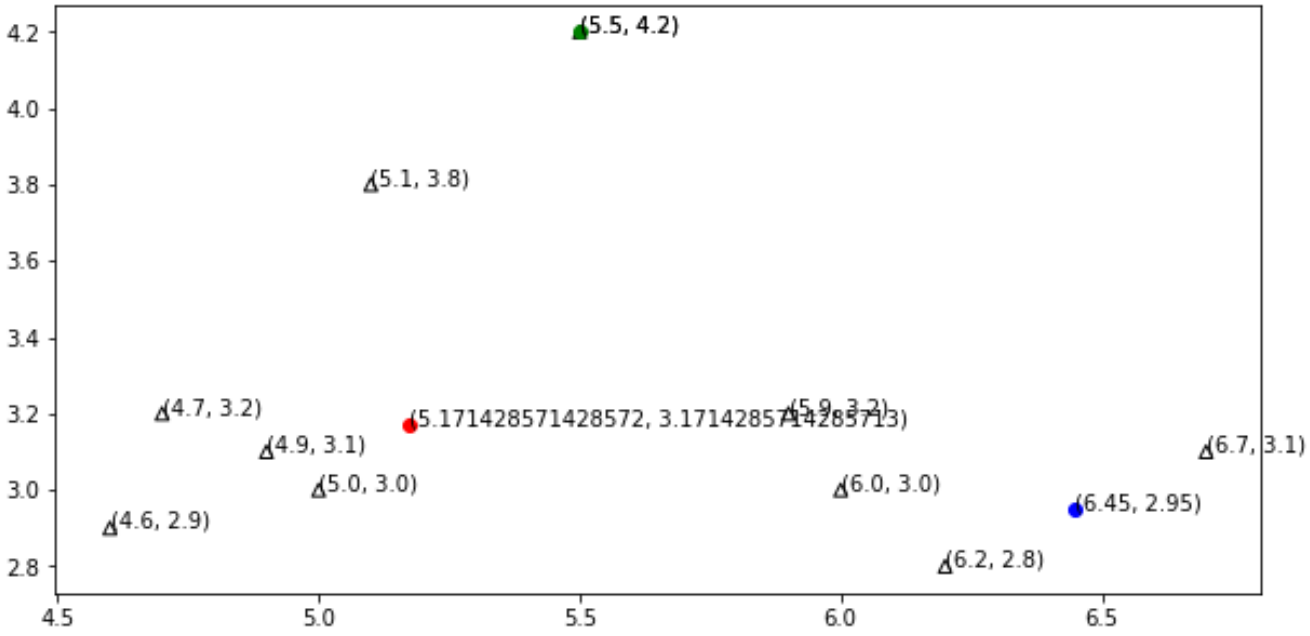
```
{(5.9, 3.2): 0,
 (4.6, 2.9): 0,
 (6.2, 2.8): 2,
 (4.7, 3.2): 0,
 (5.5, 4.2): 1,
 (5.0, 3.0): 0,
 (4.9, 3.1): 0,
 (6.7, 3.1): 2,
 (5.1, 3.8): 0,
 (6.0, 3.0): 0}
```



The data points with respect to updated centroids.('task2_iter1_b.jpg'):

```
print(updated_1_mu1,updated_1_mu2,updated_1_mu3)
```

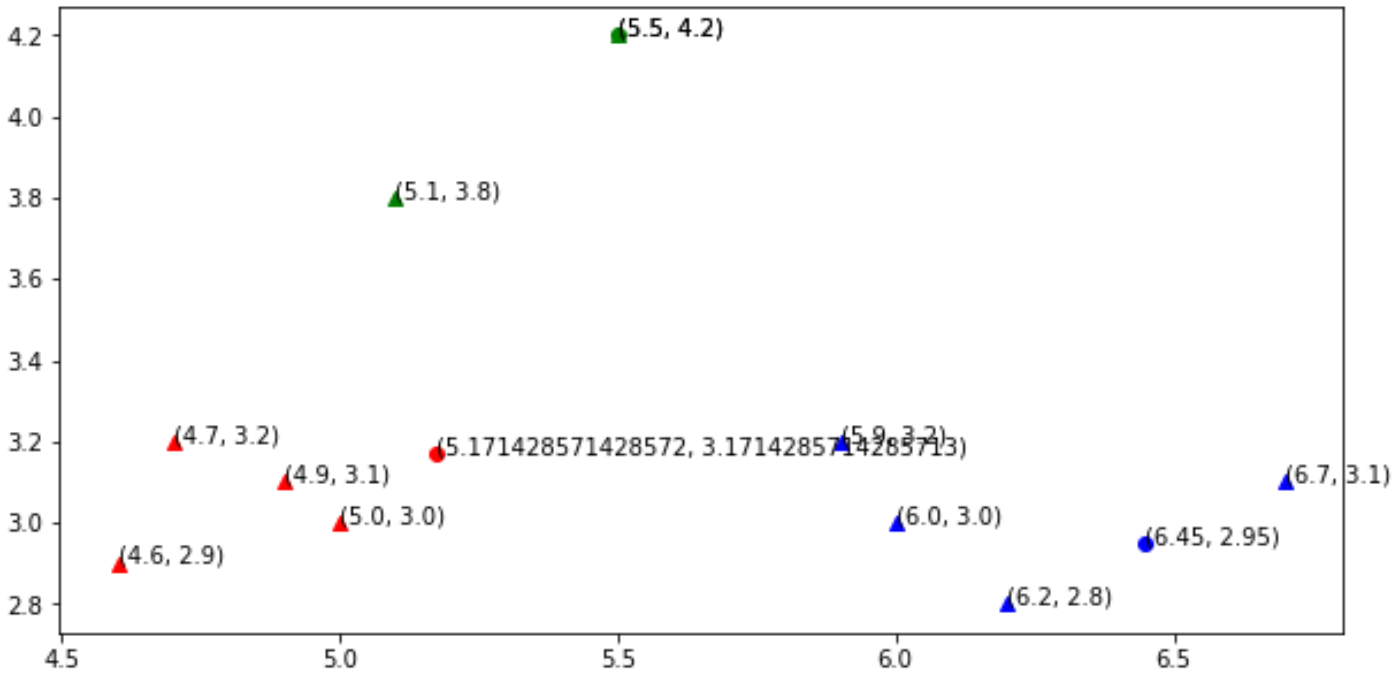
```
(5.171428571428572, 3.1714285714285713) (5.5, 4.2) (6.45, 2.95)
```



After computing k-means in the iteration2('task2_iter2_a.jpg'):

Classification of data:

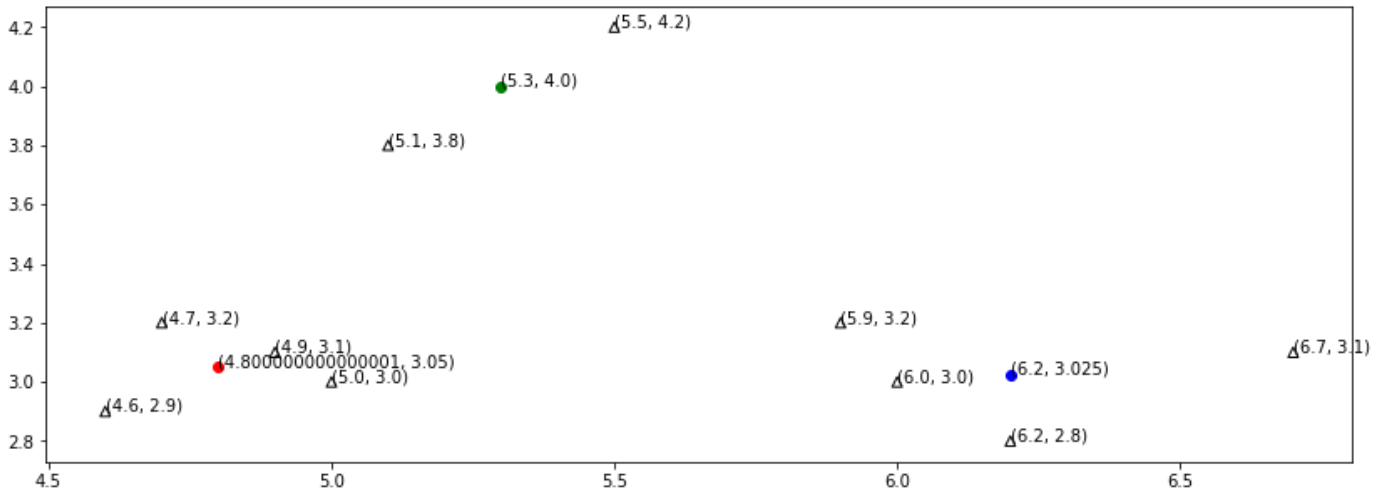
```
{(5.9, 3.2): 2,
 (4.6, 2.9): 0,
 (6.2, 2.8): 2,
 (4.7, 3.2): 0,
 (5.5, 4.2): 1,
 (5.0, 3.0): 0,
 (4.9, 3.1): 0,
 (6.7, 3.1): 2,
 (5.1, 3.8): 1,
 (6.0, 3.0): 2}
```



The data points with respect to updated centers in the iteration2('task2_iter2_b.jpg'):

```
print(updated_2_mu1,updated_2_mu2,updated_2_mu3)
```

```
(4.800000000000001, 3.05) (5.3, 4.0) (6.2, 3.025)
```




**Color Quantization:**

In color quantization, every pixel is considered as a data sample to perform k-means clustering on those pixels.

The given image has dimensions of (1200,1200,3) which gives total data samples as 1200*1200.

Initially the centers are randomly selected among 0 to 255 where the centers are of 3 dimensional. Then the distance between all the data points and centers are calculated and assigned to the center with minimum Euclidean distance. After assigning the classes to data points the mean is calculated for every class data points corresponding to their class and the centers are updated with the mean point and again the same process is followed until there is no change in the centers. If the centers are equal the while loop gets break.

The generated images after color quantization for k = 3,5,10,20

K= 3 (‘task2_baboon_3.jpg’)

K=5(‘task2_baboon_5.jpg’)

K=10('task2_baboon_10.jpg'):

K = 20('task2_baboon_20.jpg'):