

Name: Yunika Upadhayaya
ID: 1001631183
Assignment – 6

Task – 2

No, this clustering cannot be the final result of k-means algorithm. The mean of the blue dots cluster would approximately at the center of the square, while the mean of the red dot cluster would be the dot itself in the configuration since it is only one. The distance from mean blue dot to the cornered blue dots is larger than the distance from the mean blue dot to the red dot. This implies that if the nearest blue dots falls under blue cluster, then the red dot cannot fall under red cluster, because it lies close to the mean blue dot than the cornered blue dots. Thus, the current clustering configuration will not be the final k-means algorithm result.

Task – 3

Part a:

EM algorithm can produce different results if ran multiple times when applied to the same dataset with the same K. EM algorithm have different set of initialization values of means, standard deviations, and weights due to the use of mixture of gaussians, thus it will not always give the same result. In this sense, EM algorithm will use greedy approach.

Part b:

Agglomerative clustering with the d_{\min} distance will always give the same results when applied to the same dataset. This is because the minimum distance between the intermediate clusters will always be the same (given that we are using the same data) as there are no ties. At each iteration, we can guarantee same minimum distance.

Task – 4

Part a (Using d_{\min}):

2, 4, 7, 11, 16, 22, 29, 37

Iteration – I: (2, 4) (7) (11) (16) (22) (29) (37)

Iteration – II: (2, 4, 7) (11) (16) (22) (29) (37)

Iteration – III: (2, 4, 7, 11) (16) (22) (29) (37)

Iteration – IV: (2, 4, 7, 11, 16) (22) (29) (37)

Iteration – V: (2, 4, 7, 11, 16, 22) (29) (37)

Iteration – VI: (2, 4, 7, 11, 16, 22, 29) (37)

Iteration –VII: (2, 4, 7, 11, 16, 22, 29, 37)

Part b (Using d_{\max}):

2, 4, 7, 11, 16, 22, 29, 37

Iteration – I: (2, 37) (4) (7) (11) (16) (22) (29)

Iteration – II: (2, 37) (4, 29) (7) (11) (16) (22)

Iteration – III: (2, 37) (4, 29) (7, 22) (11) (16)

Iteration – IV: (2, 16, 37, 7, 22) (4, 29) (11)

Iteration – V: (2, 16, 37, 7, 22) (4, 11, 29)

Iteration – VI: (2, 16, 37, 7, 22, 4, 11, 29)