



Vidyavardhini's College of Engineering and Technology

Department of Artificial Intelligence & Data Science

Aim: To Study and Implement K-Means algorithm

Objective:- Understand the working of K-Means algorithm and it's implementation using python.

Theory:

In statistics and machine learning, k-means clustering is a method of cluster analysis which aims to partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean.

Input

K:-number of clusters

D:- data set containing n objects

Output

A set of k clusters

Given k , the k-means algorithm is implemented in 5 steps:

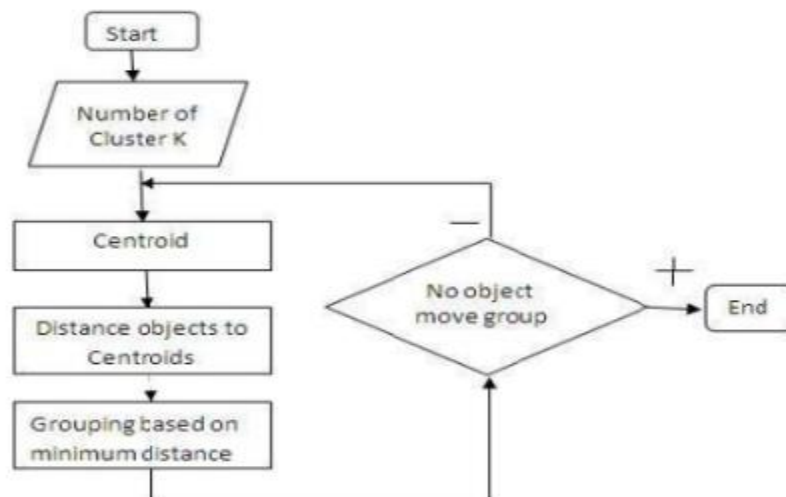
Step 1: Arbitrarily choose k objects from D as the initial cluster centers.

Step 2: Find the distance from each and every object in the dataset with respect to cluster centers

Step 3: Assign each object to the cluster with the nearest seed point based on the mean value of the objects in the cluster.

Step 4: Update the cluster means i.e calculate the mean value of the objects for each cluster.

Step 5: Repeat the procedure, until there is no change in meaning.



Example: $d = \{2, 4, 10, 12, 3, 20, 30, 11, 25\}$ $k = 2$



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1. Randomly assign mean $m1=3$ and $m2 = 4$

Therefore, $k1 = \{2,3\}$ Therefore, $k1 = \{4,10,12,20,30,11,25\}$

2. Randomly assign mean $m1=2.5$ and $m2 = 16$

Therefore, $k1 = \{2,3,4\}$ Therefore, $k1 = \{4,10,12,20,30,11,25\}$

3. Randomly assign mean $m1=3$ and $m2 = 18$

Therefore, $k1 = \{2,3,4,10\}$ Therefore, $k1 = \{12,20,30,11,25\}$

4. Randomly assign mean $m1=7$ and $m2 = 25$

Therefore, $k1 = \{2,3,4,10,11,12\}$ Therefore, $k1 = \{20,30,25\}$

5. Randomly assign mean $m1=7$ and $m2 = 25$

Therefore, we stop as we are getting same mean values.

6. Therefore, Final clusters are : $k1 = \{2,3,4,10,11,12\}$ Therefore, $k1 = \{20,30,25\}$

CODE:

```
x = int(input("enter length : "))
dataset = [0] * x
for i in range(x):
    dataset[i] = int(input("enter dataset"))
list1 = dataset
m = list1
print("DATASET: ", m)
n = int(len(m))
# randomly selecting mean
m1 = list1[0]
m2 = list1[n-1]
print("mean m1 :", m1)
print("mean m2 :", m2)
# first iteration
iteration = 1
p = [0]*x # declaring array
```



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```
q = [0]*x
for i in range(n):
    g = abs(m1-m[i])
    h = abs(m2-m[i])
    if g < h:
        p[i] = m[i]
    else:
        q[i] = m[i]
print("CLUSTER 1 p: ", p)
print("CLUSTER 2 q: ", q)
print("ITERATION NO : ", iteration)
# removing zero from clusters
q = list(filter(lambda num: num != 0, q))
p = list(filter(lambda num: num != 0, p))
print(p, q)
```

OUTPUT:

```
PS D:\Vartak college\SEM 5\DWM\code> py .\kmean.py
enter length : 10
enter dataset11
enter dataset12
enter dataset13
enter dataset14
enter dataset15
enter dataset12
enter dataset15
enter dataset156
enter dataset14
enter dataset13
DATASET: [11, 12, 13, 14, 15, 12, 15, 156, 14, 13]
mean m1 : 11
mean m2 : 13
CLUSTER 1 p: [11, 0, 0, 0, 0, 0, 0, 0, 0, 0]
CLUSTER 2 q: [0, 12, 13, 14, 15, 12, 15, 156, 14, 13]
ITERATION NO : 1
[11] [12, 13, 14, 15, 12, 15, 156, 14, 13]
```



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CONCLUSION:

Thus, we have studied to implement and understand the working of K-Means algorithm using python. k-means clustering is a method of cluster analysis which aims to partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean.