Experiment 2.3

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AIM :-

To perform the cluster analysis by K-mean method using R.

Theory :-

K Means Clustering in R Programming is an Unsupervised Non-linear algorithm that cluster data based on similarity or similar groups. It seeks to partition the observations into a pre-specified number of clusters. Segmentation of data takes place to assign each training example to a segment called a cluster. In the unsupervised algorithm, high reliance on raw data is given with large expenditure on manual review for review of relevance is given. It is used in a variety of fields like Banking, healthcare, retail, Media, etc.

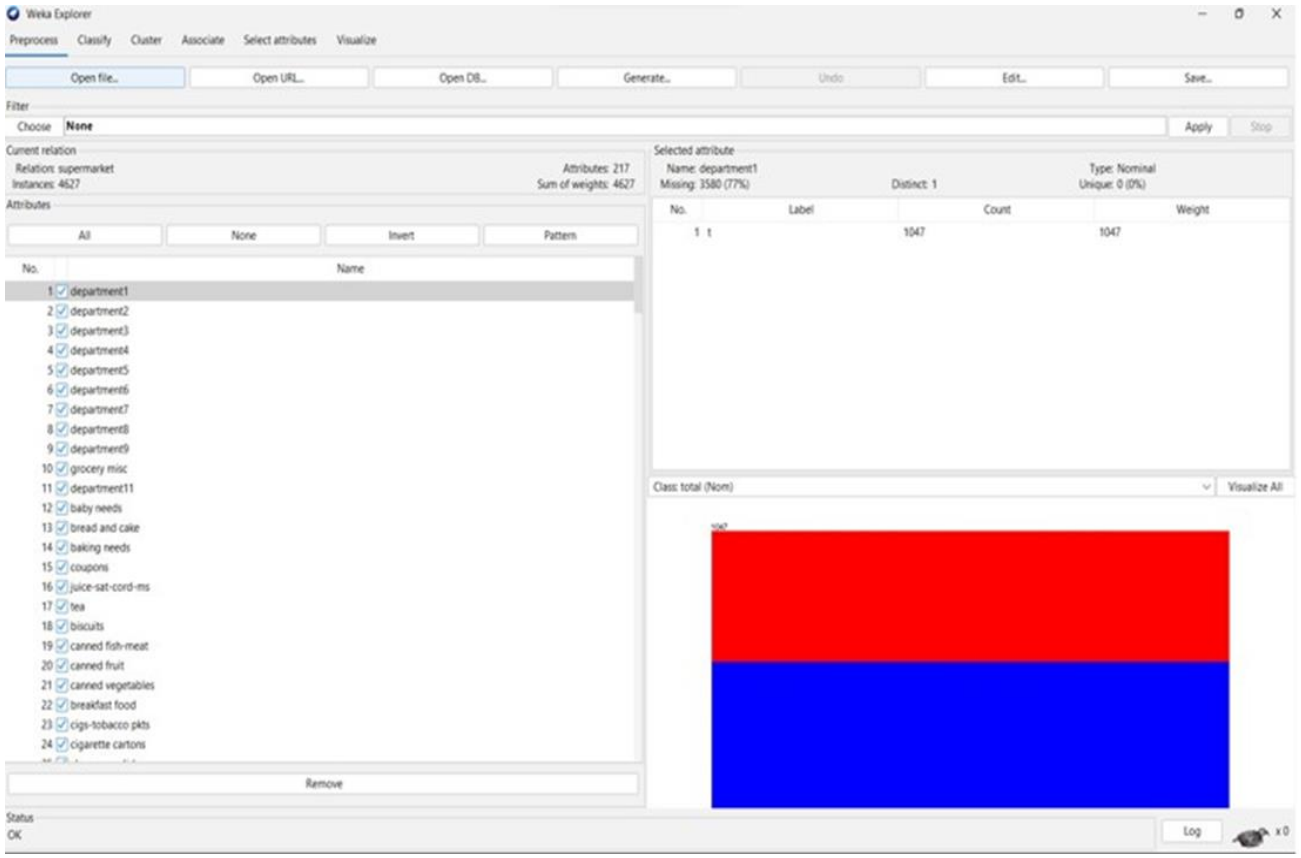
- K-Means clustering groups the data on similar groups. The algorithm is as follows:-
  - Choose the number K clusters.
  - Select at random K points, the centroids (Not necessarily from the given data).
  - Assign each data point to closest centroid that forms K clusters.
  - Compute and place the new centroid of each centroid.
  - After final reassignment, name the cluster as Final cluster.

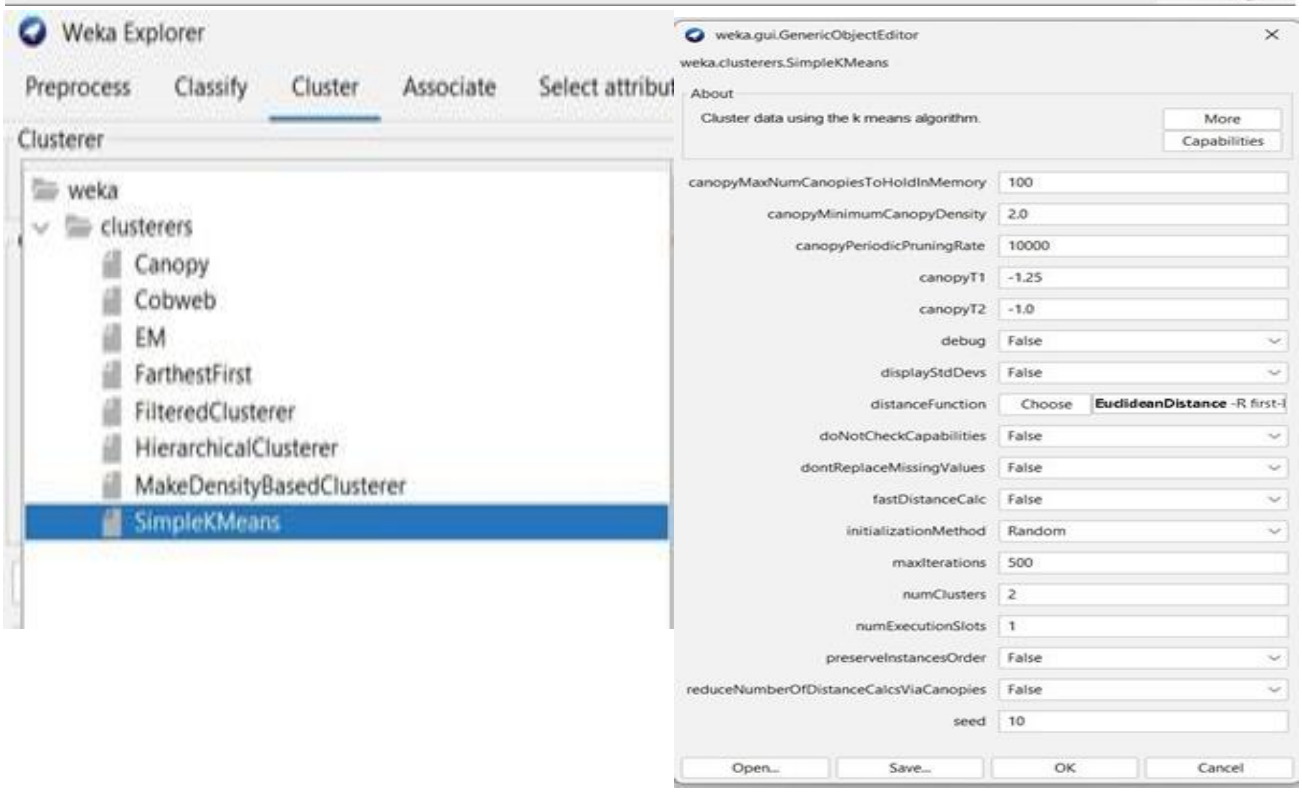
Output :-

```
# Installing Packages

install.packages("ClusterR")

install.packages("cluster")

# Loading package

library(ClusterR)

library(cluster)

# Removing initial label of

# Species from original dataset

iris_1 <- iris[, -5]
```

```
# Fitting K-Means clustering Model
# to training dataset
set.seed(240) # Setting seed
kmeans.re <- kmeans(iris_1, centers = 3, nstart = 20)
kmeans.re
Cluster identification for
# each observation
kmeans.re$cluster
# Confusion Matrix
cm <- table(iris$Species, kmeans.re$cluster)
cm
# Model Evaluation and visualization
plot(iris_1[c("Sepal.Length", "Sepal.Width")])
plot(iris_1[c("Sepal.Length", "Sepal.Width")],
    col = kmeans.re$cluster)
plot(iris_1[c("Sepal.Length", "Sepal.Width")],
    col = kmeans.re$cluster,
    main = "K-means with 3 clusters")
## Plotiing cluster centers
kmeans.re$centers
kmeans.re$centers[, c("Sepal.Length", "Sepal.Width")]
# cex is font size, pch is symbol
points(kmeans.re$centers[, c("Sepal.Length", "Sepal.Width")],
      col = 1:3, pch = 8, cex = 3)
## Visualizing clusters
y_kmeans <- kmeans.re$cluster
clusplot(iris_1[, c("Sepal.Length", "Sepal.Width")],
         y_kmeans,
         lines = 0,
         shade = TRUE,
         color = TRUE,
         labels = 2,
         plotchar = FALSE,
         span = TRUE,
```

```
main = paste("Cluster iris"),
xlab = 'Sepal.Length', ylab = 'Sepal.Width')
```





Clusterer output

```
=== Run information ===

Scheme:       weka.clusterers.SimpleKMeans -init 0 -max-candidates 100 -periodic-pruning 10000 -min-density 2.0 -t1 -1.25 -t2 -1.0 -N 2 -A "weka.core.EuclideanD:
Relation:     supermarket
Instances:    4627
Attributes:   217
              [list of attributes omitted]
Test mode:    split 66% train, remainder test


=== Clustering model (full training set) ===


kMeans
======

Number of iterations: 2
Within cluster sum of squared errors: 0.0

Initial starting points (random):

Cluster 0: t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,
Cluster 1: t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,t,

Missing values globally replaced with mean/mode

Final cluster centroids:
                                  Cluster#
Attribute              Full Data          0          1
                        (4627.0)   (1679.0)   (2948.0)
======================================================
department1                    t          t          t
department2                    t          t          t
department3                    t          t          t
department4                    t          t          t
department5                    t          t          t
department6                    t          t          t
department7                    t          t          t
department210                  t          t          t
department211                  t          t          t
department212                  t          t          t
department213                  t          t          t
department214                  t          t          t
department215                  t          t          t
department216                  t          t          t
total                        low        low       high



Time taken to build model (percentage split) : 0.12 seconds

Clustered Instances

0       987 ( 63%)
1       587 ( 37%)
```