WORKSHEET:-7

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Branch:- BE CSE **Section:- 20BCS_DM_716/B**

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Subject:- Data Mining Lab **Subject Code:- 20CSP-376**

AIM:-

- To perform the cluster analysis by k-means 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.

DATASET:-

Iris dataset consists of 50 samples from each of 3 species of Iris (Iris setosa, Iris virginica, Iris versicolor) and a multivariate dataset introduced by British statistician and biologist Ronald Fisher in his 1936 paper The use of multiple measurements in taxonomic problems. Four features were measured from each sample i.e length and width of the sepals and petals and based on the combination of these four features, Fisher developed a linear discriminant model to distinguish the species from each other.

```
# Loading data
data(iris)
# Structure
str(iris)
```

Performing K-Means Clustering on Dataset:-

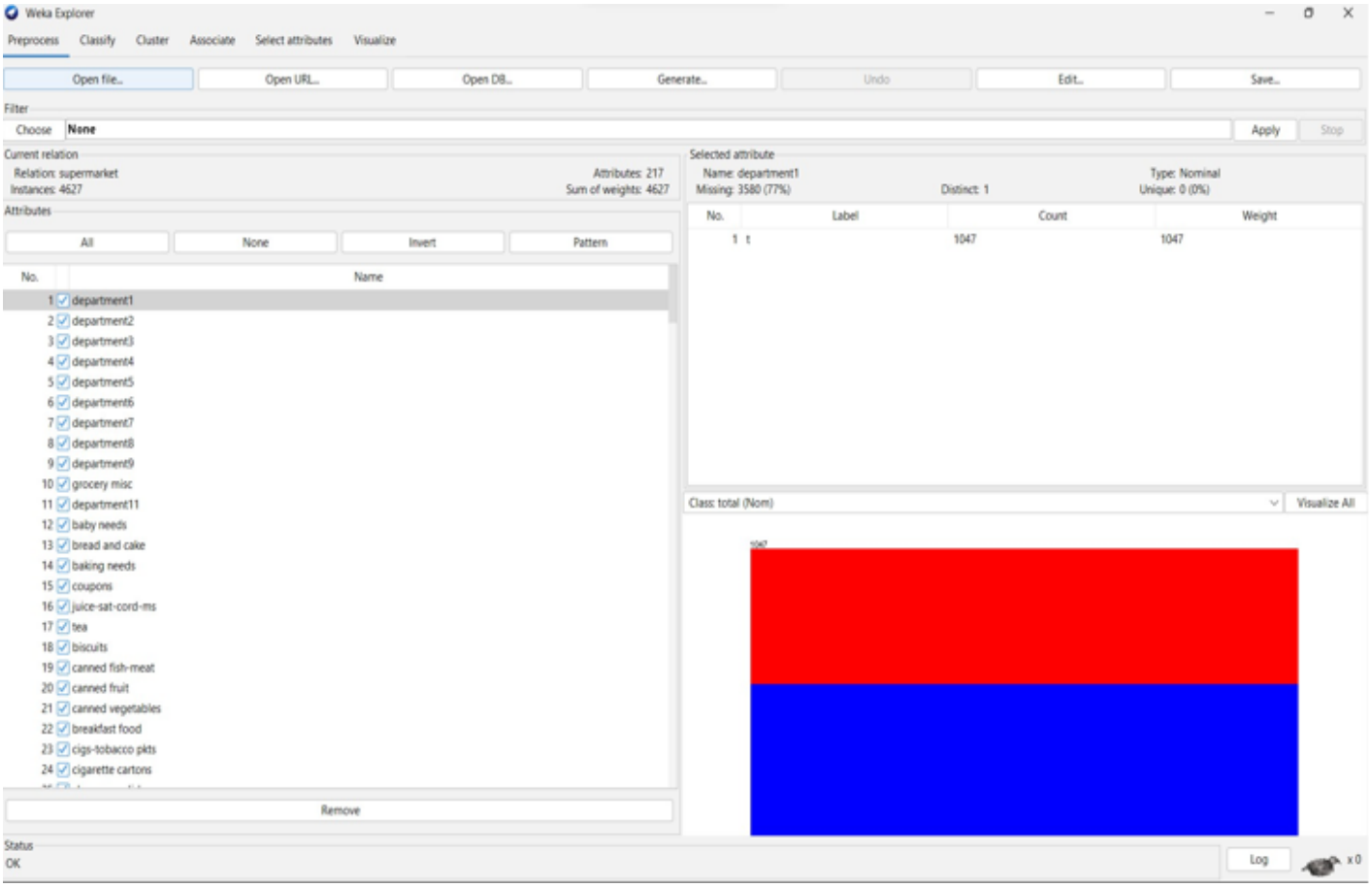
Using K-Means Clustering algorithm on the dataset which includes 11 persons and 6 variables or attributes.

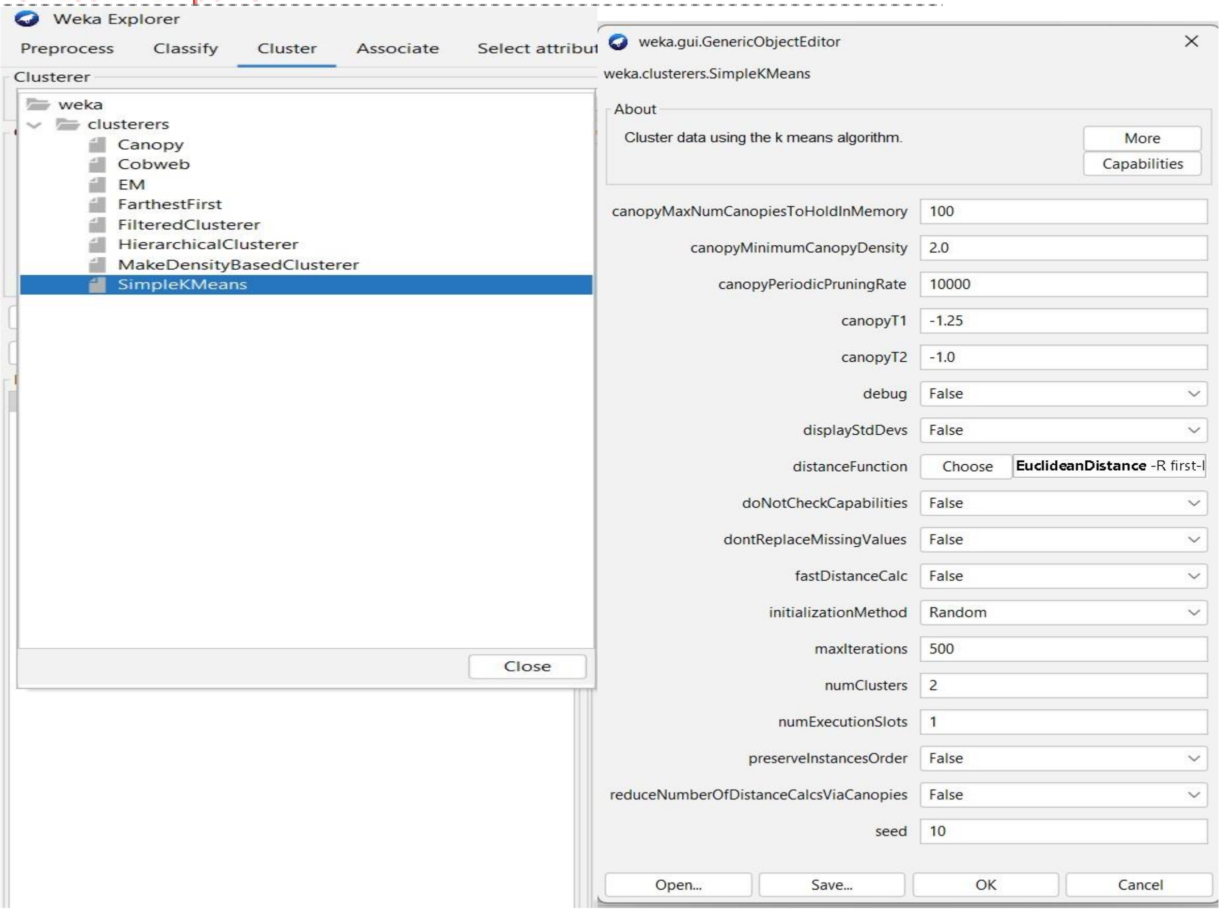
```
# Installing Packages
install.packages("ClusterR")
install.packages("cluster")

# 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$clust
er
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"),
```

OUTPUT SCREENSHOT:-

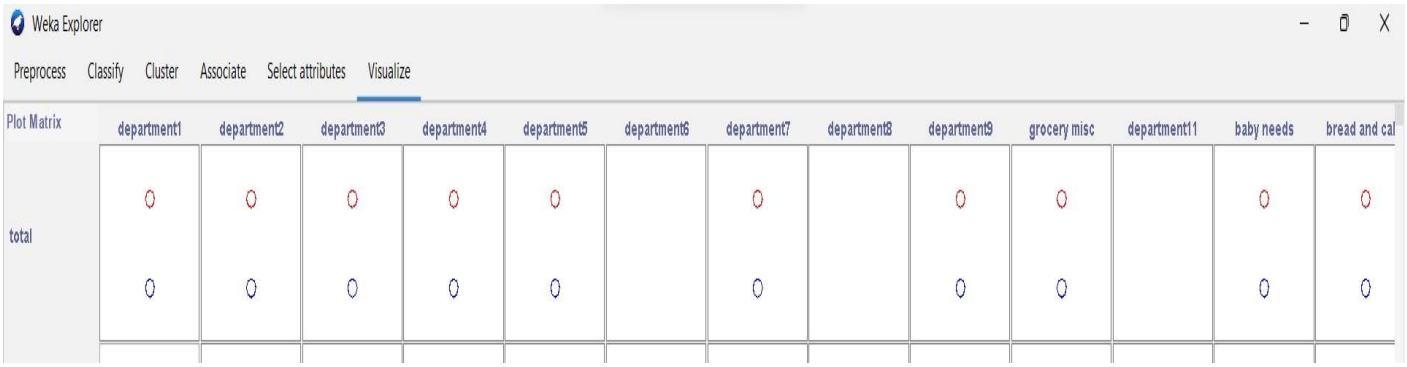




Clusterer output

```
=== 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,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,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
department8                  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%)
```



}