WORKSHEET:-7

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Branch:- BE CSE **Section:- 20BCS_DM_605-B**

Semester:- 6th **Date of performance:- 25/04/2023**

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.

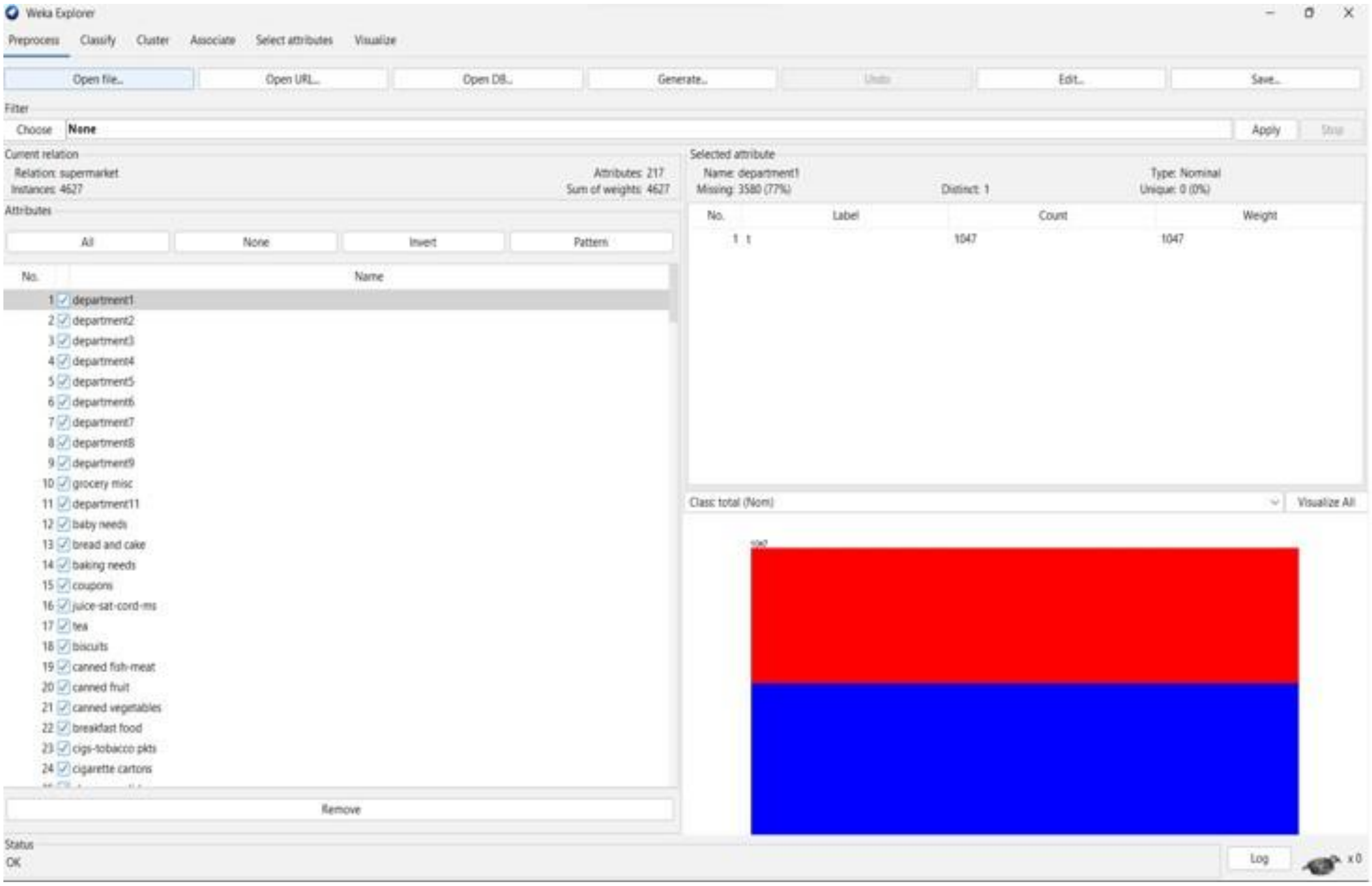
```
# Loading data

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:-



Filter
Choose None

Current relation
Relation: supermarket
Instances: 4627
Attributes: 217
Sum of weights: 4627

Selected attribute
Name: department1
Missing: 3580 (77%)
Distinct: 1
Type: Nominal
Unique: 0 (0%)

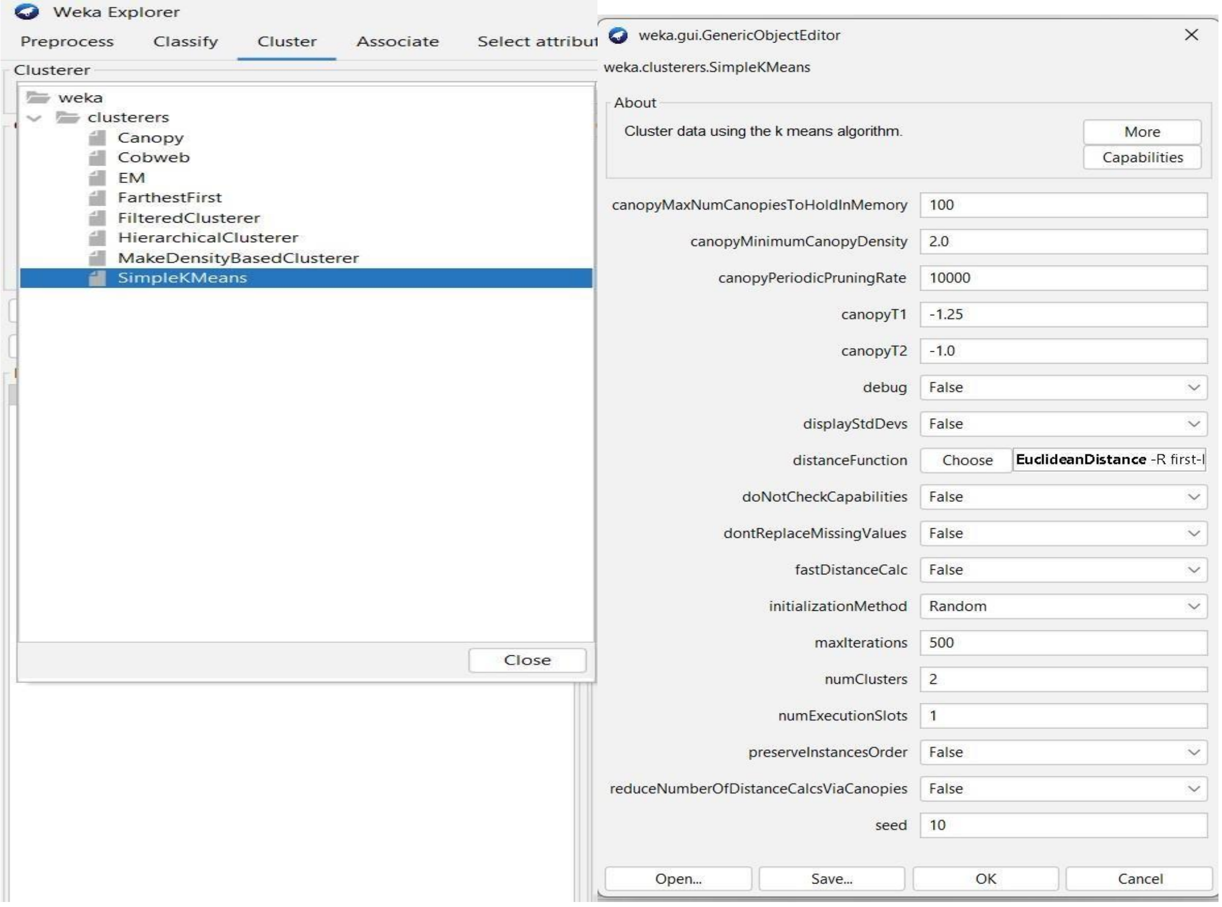
No.	Label	Count	Weight
1	t	1047	1047

Attributes

No.		Name
1	☑	department1
2	☑	department2
3	☑	department3
4	☑	department4
5	☑	department5
6	☑	department6
7	☑	department7
8	☑	department8
9	☑	department9
10	☑	grocery misc
11	☑	department11
12	☑	baby needs
13	☑	bread and cake
14	☑	baking needs
15	☑	coupons
16	☑	juice-sat-cord-ms
17	☑	tea
18	☑	biscuits
19	☑	canned fish-meat
20	☑	canned fruit
21	☑	canned vegetables
22	☑	breakfast food
23	☑	cigs-tobacco pkts
24	☑	cigarette cartons

Class: total (Nom)

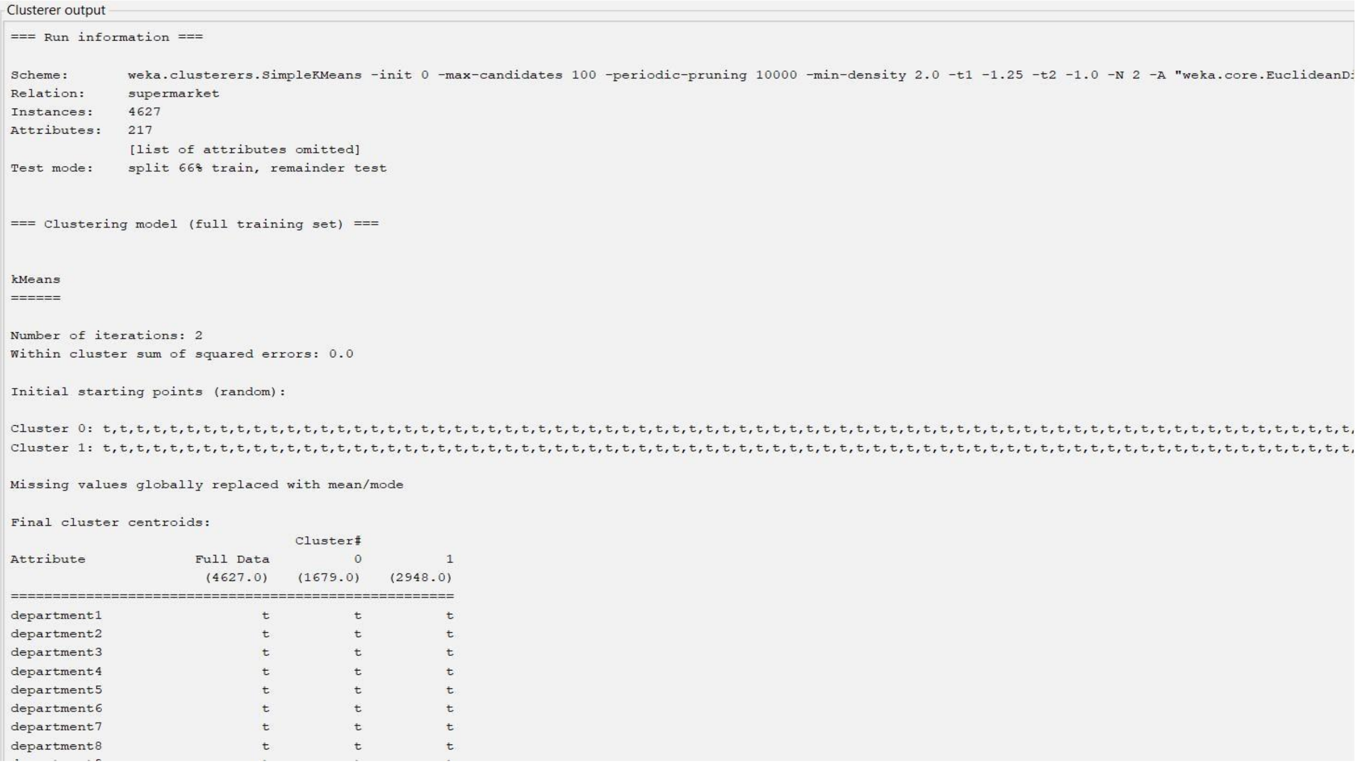
Status
OK



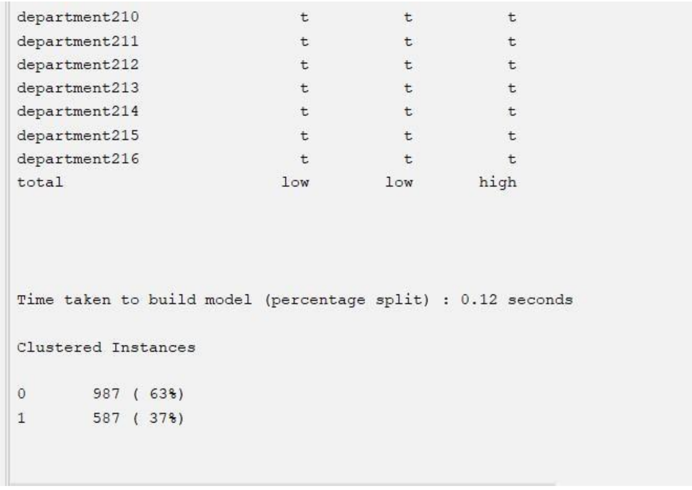
weka.clusterers.SimpleKMeans

Cluster data using the k means algorithm.

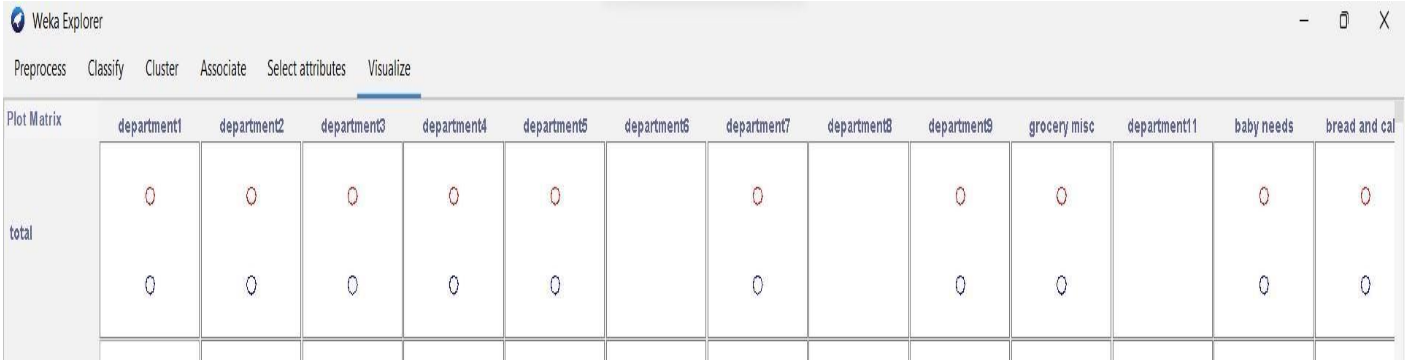
canopyMaxNumCanopiesToHoldInMemory	100
canopyMinimumCanopyDensity	2.0
canopyPeriodicPruningRate	10000
canopyT1	-1.25
canopyT2	-1.0
debug	False
displayStdDevs	False
distanceFunction	EuclideanDistance -R first-l
doNotCheckCapabilities	False
dontReplaceMissingValues	False
fastDistanceCalc	False
initializationMethod	Random
maxIterations	500
numClusters	2
numExecutionSlots	1
preserveInstancesOrder	False
reduceNumberOfDistanceCalcsViaCanopies	False
seed	10


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%)
```



}