## Implement clustering techniques – Hierarchical and K-Means

### AIM:

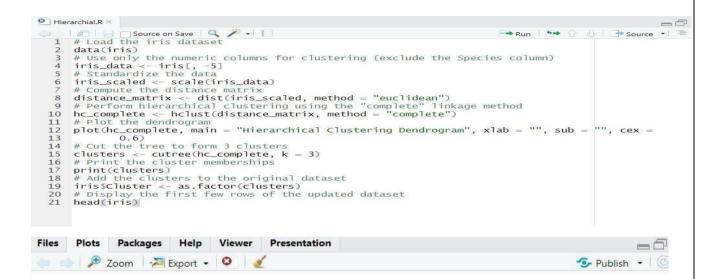
To Implement clustering techniques Hierarchical and K-Means using R programming in R Studio.

## a) HIERARCHIAL CLUSTERING

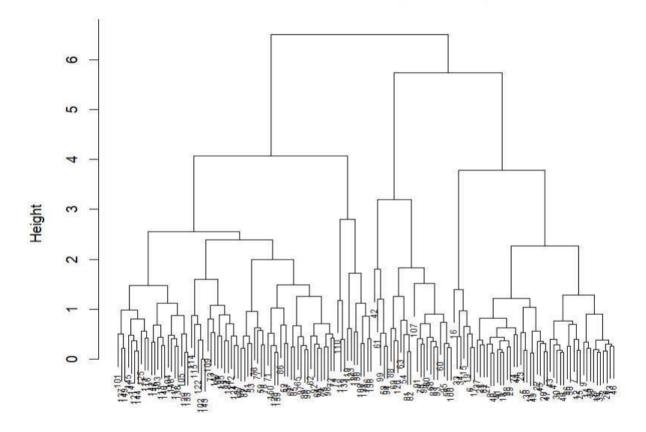
```
# Load the iris dataset data(iris)
# Use only the numeric columns for clustering (exclude the Species column) iris_data <-
iris[, -5]
# Standardize the data iris scaled
<- scale(iris_data)
# Compute the distance matrix distance_matrix <- dist(iris_scaled, method
= "euclidean")
# Perform hierarchical clustering using the "complete" linkage method hc_complete <-
hclust(distance_matrix, method = "complete")
# Plot the dendrogram plot(hc_complete, main = "Hierarchical Clustering Dendrogram", xlab
= "", sub = "", cex =
0.6)
# Cut the tree to form 3 clusters clusters
<- cutree(hc_complete, k = 3)
# Print the cluster memberships print(clusters)
# Add the clusters to the original dataset iris$Cluster
<- as.factor(clusters)
```

# Display the first few rows of the updated dataset head(iris)

#### **OUTPUT:**

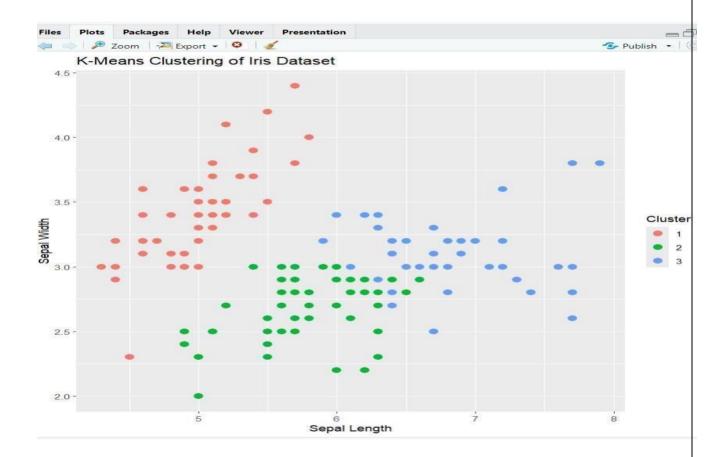


# **Hierarchical Clustering Dendrogram**



#### b) K-MEANS CLUSTERING

```
# Load the iris dataset data(iris)
# Use only the numeric columns for clustering (exclude the Species column) iris_data <-
iris[, -5]
# Standardize the data iris_scaled
<- scale(iris_data)
# Set the number of clusters set.seed(123)
# For reproducibility k < -3
# Number of clusters
# Perform K-Means clustering
kmeans_result <- kmeans(iris_scaled, centers = k, nstart = 25)
# Print the K-Means result
print(kmeans_result)
# Print the cluster centers
print(kmeans_result$centers)
# Add the cluster assignments to the original dataset iris$Cluster <-
as.factor(kmeans_result$cluster)
# Display the first few rows of the updated dataset head(iris)
# Plot the clusters library(ggplot2) ggplot(iris, aes(x = Sepal.Length, y = Sepal.Width, color =
Cluster)) + geom_point(size = 3) + labs(title = "K-Means Clustering of Iris Dataset", x = "Sepal
Length", y = "Sepal Width") OUTPUT:
```



## **RESULT:**

Thus, the Implement clustering techniques Hierarchical and K-Means using R programming in R Studio have been successfully executed.