

Implement clustering techniques – Hierarchical and K-Means**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)

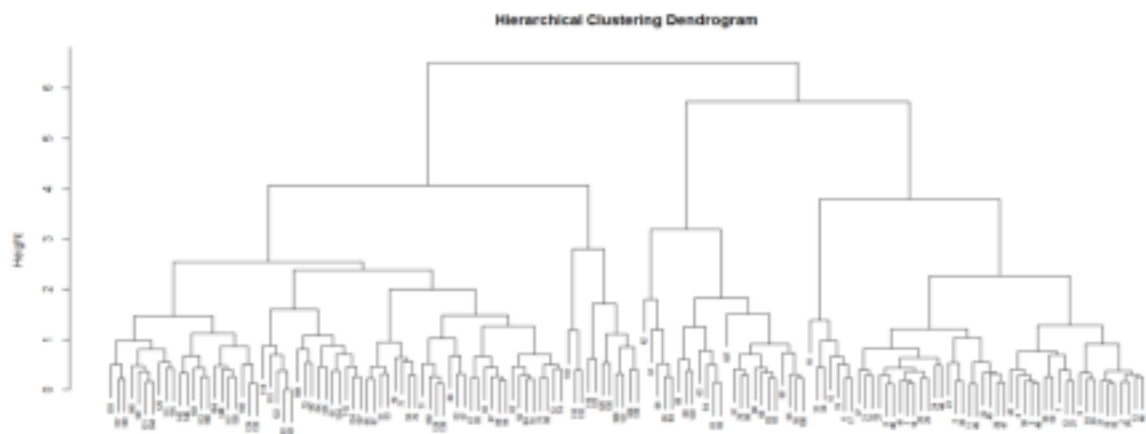
# Add the clusters to the original dataset
iris$Cluster <- as.factor(clusters)

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

```

R Console
>
> # Cut the tree to form 3 clusters
> clusters <- cutree(hc_complete, k = 3)
>
> # Print the cluster memberships
> print(clusters)
[1] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
[38] 1 1 1 1 2 1 1 1 1 1 1 1 1 3 3 3 2 3 2 3 2 3 2 2 3 2 3 3 3 3 2 2 2 3 3 3
[75] 3 3 3 3 3 2 2 2 2 3 3 3 3 2 3 2 2 3 2 2 2 3 3 3 2 2 3 3 3 3 3 3 2 3 3 3
[112] 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
[149] 3 3
>
> # Add the clusters to the original dataset
> iris$Cluster <- as.factor(clusters)
>
> # Display the first few rows of the updated dataset
> head(iris)
  Sepal.Length Sepal.Width Petal.Length Petal.Width Species Cluster
1           5.1         3.5          1.4          0.2  setosa      1
2           4.9         3.0          1.4          0.2  setosa      1
3           4.7         3.2          1.3          0.2  setosa      1
4           4.6         3.1          1.5          0.2  setosa      1
5           5.0         3.6          1.4          0.2  setosa      1
6           5.4         3.9          1.7          0.4  setosa      1
>

```



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)

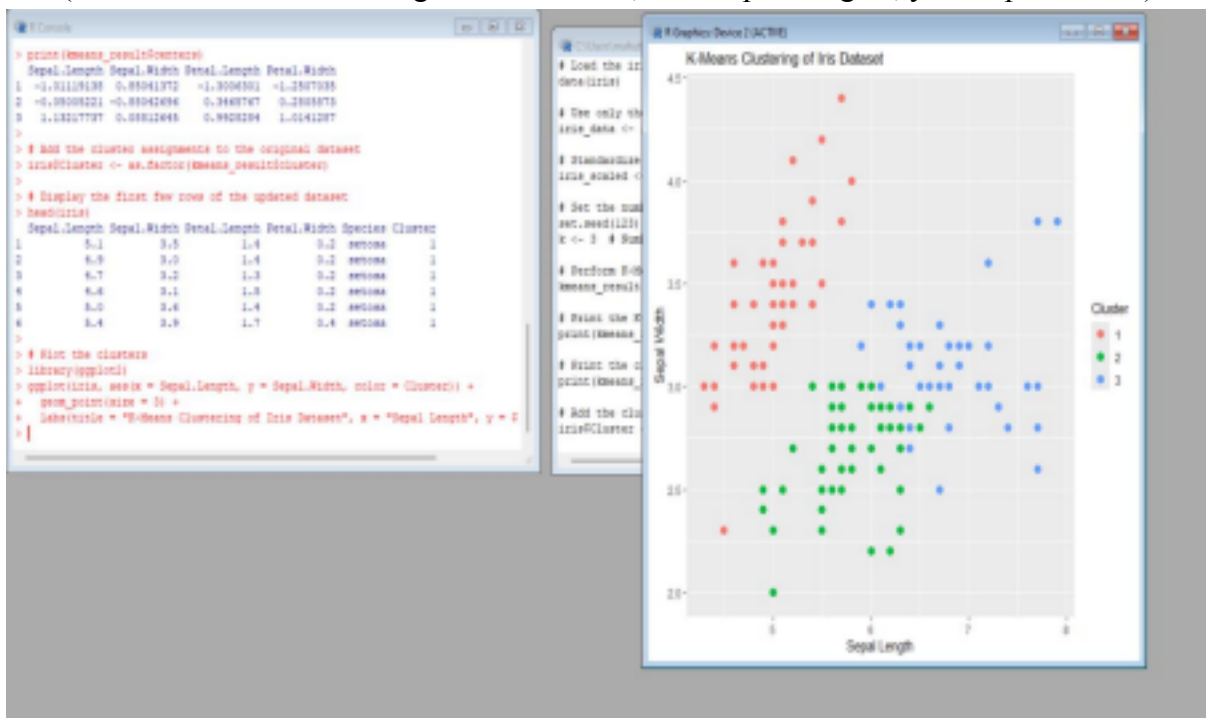
# Print the cluster centers
print(kmeans_result$centers)

# 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")

```



RESULT:

Thus the implementation of clustering techniques – Hierarchical and K-Means is executed successfully