Exp:9

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)
```
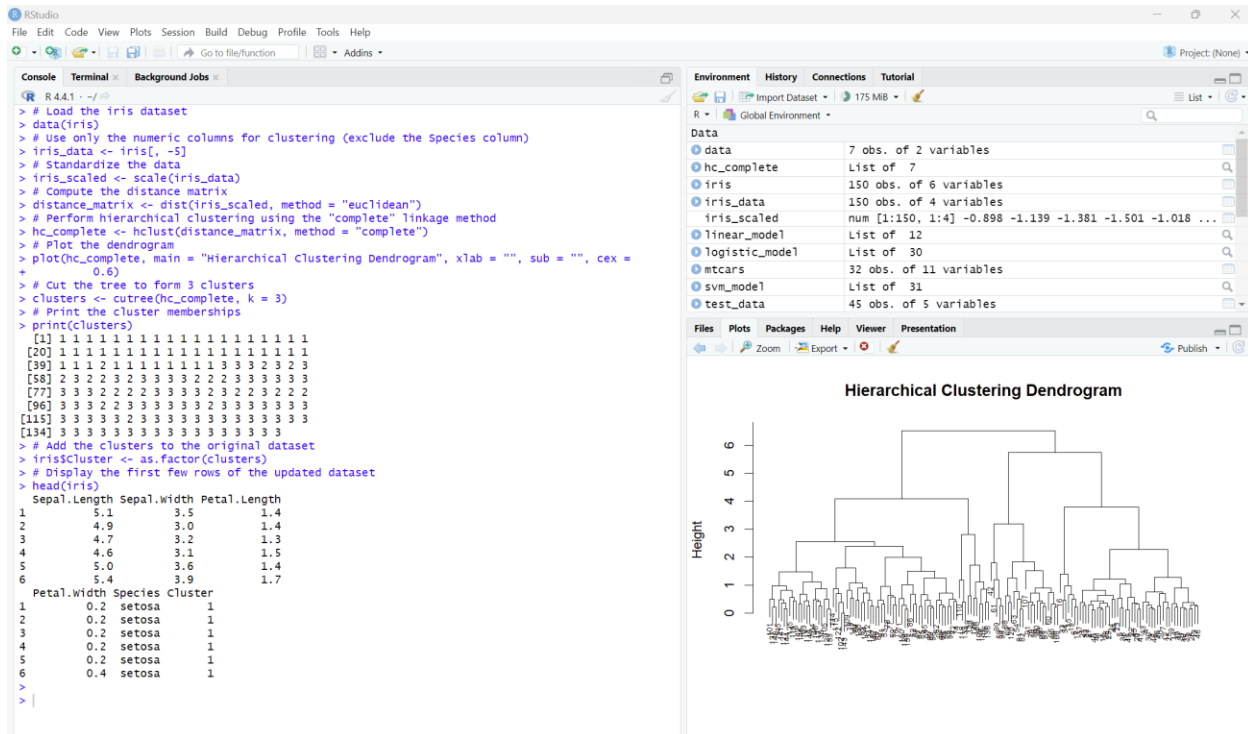
b) K-MEANS CLUSTERING

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")