

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")

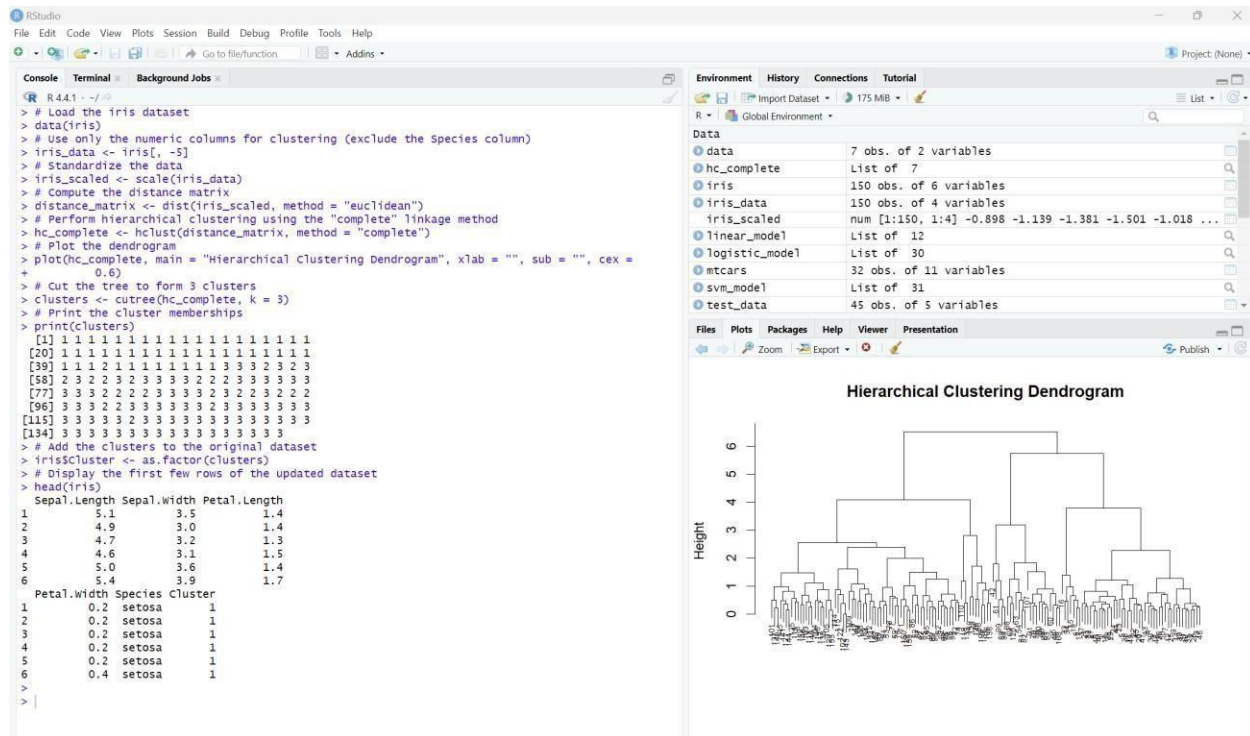
# Plot the dendrogram
plot(hc_complete, main = "Hierarchical Clustering Dendrogram", xlab = "", sub = "", cex =
0.6)

# 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")
```

