Exp. No: 9

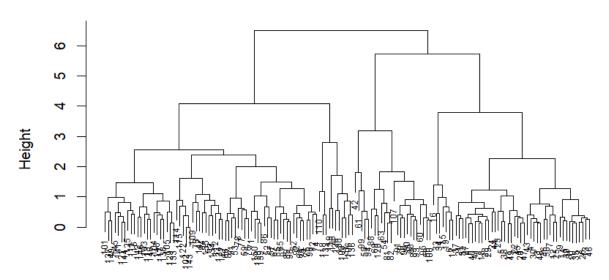
Implement clustering techniques – Hierarchical and K-Means

a) Hierarchical Clustering

```
# Load the iris dataset
data(iris)
# Use only the numeric columns for clustering (exclude the Species column)
iris_data <- iris[, -5]</pre>
# Standardize the data
iris scaled <- scale(iris data)</pre>
# Compute the distance matrix
distance_matrix <- dist(iris_scaled, method = "euclidean")</pre>
# Perform hierarchical clustering using the "complete" linkage method
hc complete <- hclust(distance matrix, method = "complete")</pre>
# 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)</pre>
# 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]</pre>

Standardize the data

iris_scaled <- scale(iris_data)</pre>

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)</pre>

Print the K-Means result

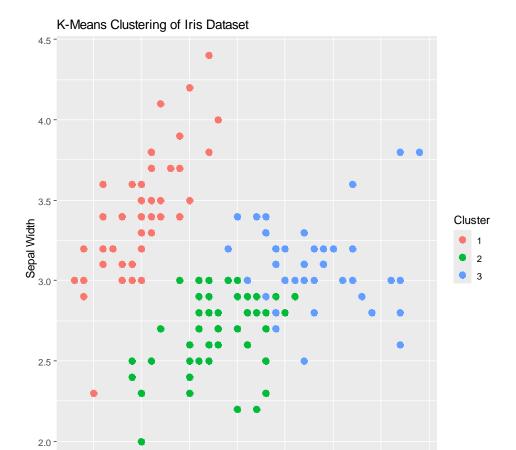
print(kmeans_result)

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")</pre>
```

Output:

```
Notes/GitHub/210701080
K-means clustering with 3 clusters of sizes 50, 53, 47
Cluster means:
  Sepal.Length Sepal.Width Petal.Length Petal.Width
  -1.3006301 -1.2507035
                          0.3465767
                                    0.2805873
                          0.9928284
                                    1.0141287
Within cluster sum of squares by cluster:
[1] 47.35062 44.08754 47.45019
 (between_SS / total_SS = 76.7 \%)
Available components:
[1] "cluster"
[7] "size"
                                           "withinss"
                                                        "tot.withinss" "betweenss"
                 "centers"
                             "totss"
                "iter"
                             "ifault"
  Sepal.Length Sepal.Width Petal.Length Petal.Width
                        -1.3006301 -1.2507035
  -1.01119138 0.85041372
  -0.05005221 -0.88042696
1.13217737 0.08812645
                                    0.2805873
                          0.3465767
3
                          0.9928284
                                    1.0141287
```



Sepal Length