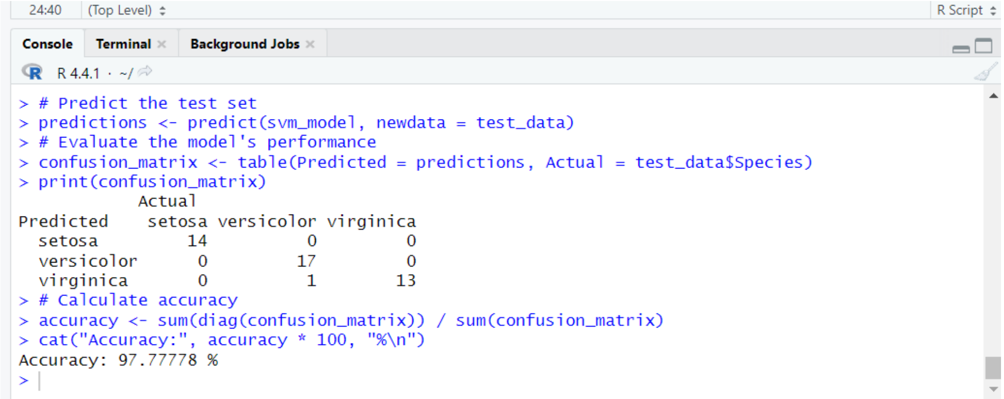
Exp. No : 8

Implement SVM/Decision tree classification techniques

a) SVM in R

```
# Install and load the e1071 package (if not already installed)

install.packages("e1071")

library(e1071)

# Load the iris dataset

data(iris)

# Inspect the first few rows of the dataset

head(iris)

# Split the data into training (70%) and testing (30%) sets

set.seed(123) # For reproducibility

sample_indices <- sample(1:nrow(iris), 0.7 * nrow(iris))

train_data <- iris[sample_indices, ]

test_data <- iris[-sample_indices, ]

# Fit the SVM model

svm_model <- svm(Species ~ ., data = train_data, kernel = "radial")

# Print the summary of the model

summary(svm_model)

# Predict the test set

predictions <- predict(svm_model, newdata = test_data)

# Evaluate the model's performance

confusion_matrix <- table(Predicted = predictions, Actual = test_data$Species)

print(confusion_matrix)

# Calculate accuracy

accuracy <- sum(diag(confusion_matrix)) / sum(confusion_matrix)

cat("Accuracy:", accuracy * 100, "%\n")
```

Output :



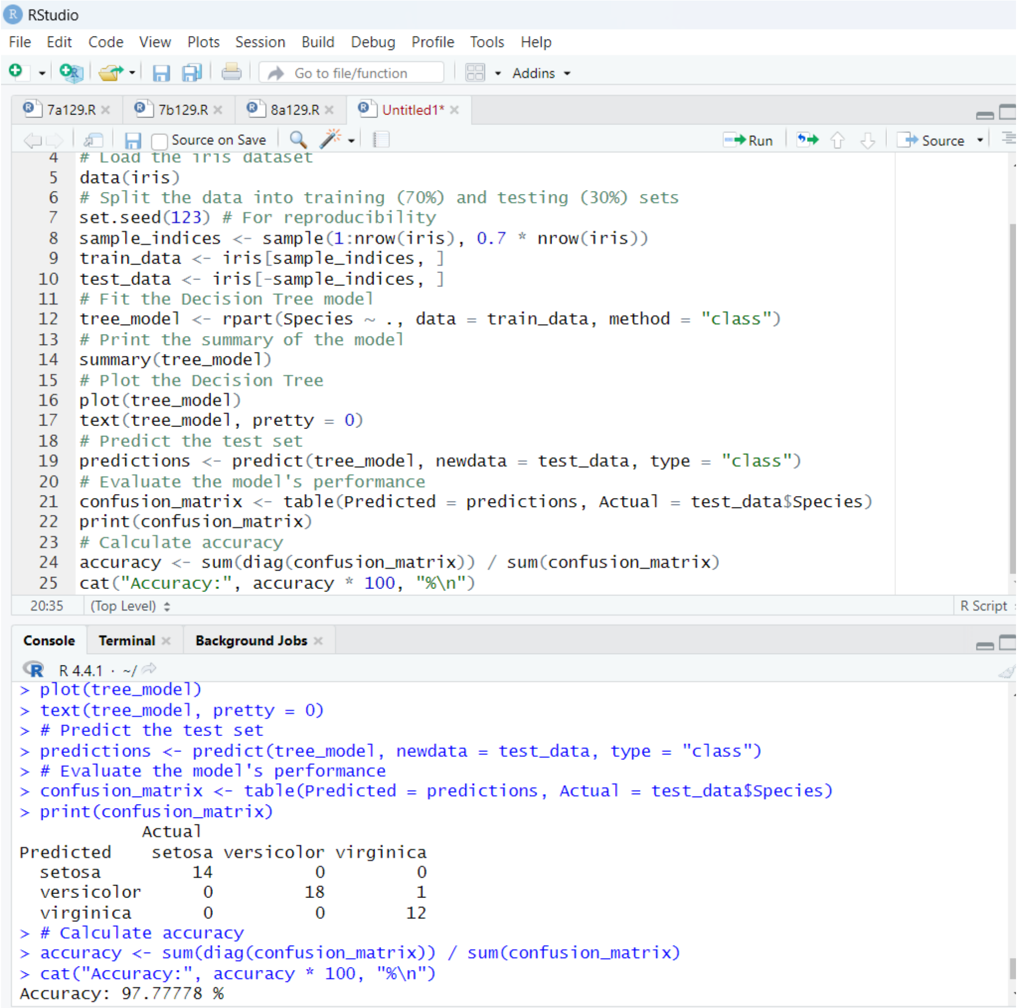
```
> # Predict the test set
> predictions <- predict(svm_model, newdata = test_data)
> # Evaluate the model's performance
> confusion_matrix <- table(Predicted = predictions, Actual = test_data$Species)
> print(confusion_matrix)
            Actual
Predicted    setosa versicolor virginica
  setosa         14          0         0
  versicolor      0         17         0
  virginica       0          1        13
> # Calculate accuracy
> accuracy <- sum(diag(confusion_matrix)) / sum(confusion_matrix)
> cat("Accuracy:", accuracy * 100, "%\n")
Accuracy: 97.77778 %
> 
```

b) Decision Tree in R

```
# Install and load the rpart package (if not already installed)

install.packages("rpart")

library(rpart)

# Load the iris dataset

data(iris)

# Split the data into training (70%) and testing (30%) sets

set.seed(123) # For reproducibility

sample_indices <- sample(1:nrow(iris), 0.7 * nrow(iris))

train_data <- iris[sample_indices, ]

test_data <- iris[-sample_indices, ]

# Fit the Decision Tree model

tree_model <- rpart(Species ~ ., data = train_data, method = "class")

# Print the summary of the model

summary(tree_model)

# Plot the Decision Tree

plot(tree_model)

text(tree_model, pretty = 0)

# Predict the test set

predictions <- predict(tree_model, newdata = test_data, type = "class")
```

```
# Evaluate the model's performance

confusion_matrix <- table(Predicted = predictions, Actual = test_data$Species)

print(confusion_matrix)

# Calculate accuracy

accuracy <- sum(diag(confusion_matrix)) / sum(confusion_matrix)

cat("Accuracy:", accuracy * 100, "%\n")
```

Output :



```
# Load the iris dataset
data(iris)
# Split the data into training (70%) and testing (30%) sets
set.seed(123) # For reproducibility
sample_indices <- sample(1:nrow(iris), 0.7 * nrow(iris))
train_data <- iris[sample_indices, ]
test_data <- iris[-sample_indices, ]
# Fit the Decision Tree model
tree_model <- rpart(Species ~ ., data = train_data, method = "class")
# Print the summary of the model
summary(tree_model)
# Plot the Decision Tree
plot(tree_model)
text(tree_model, pretty = 0)
# Predict the test set
predictions <- predict(tree_model, newdata = test_data, type = "class")
# Evaluate the model's performance
confusion_matrix <- table(Predicted = predictions, Actual = test_data$Species)
print(confusion_matrix)
# Calculate accuracy
accuracy <- sum(diag(confusion_matrix)) / sum(confusion_matrix)
cat("Accuracy:", accuracy * 100, "%\n")
```

```
> plot(tree_model)
> text(tree_model, pretty = 0)
> # Predict the test set
> predictions <- predict(tree_model, newdata = test_data, type = "class")
> # Evaluate the model's performance
> confusion_matrix <- table(Predicted = predictions, Actual = test_data$Species)
> print(confusion_matrix)
            Actual
Predicted    setosa versicolor virginica
  setosa         14          0         0
  versicolor      0         18         1
  virginica       0          0        12
> # Calculate accuracy
> accuracy <- sum(diag(confusion_matrix)) / sum(confusion_matrix)
> cat("Accuracy:", accuracy * 100, "%\n")
Accuracy: 97.77778 %
```

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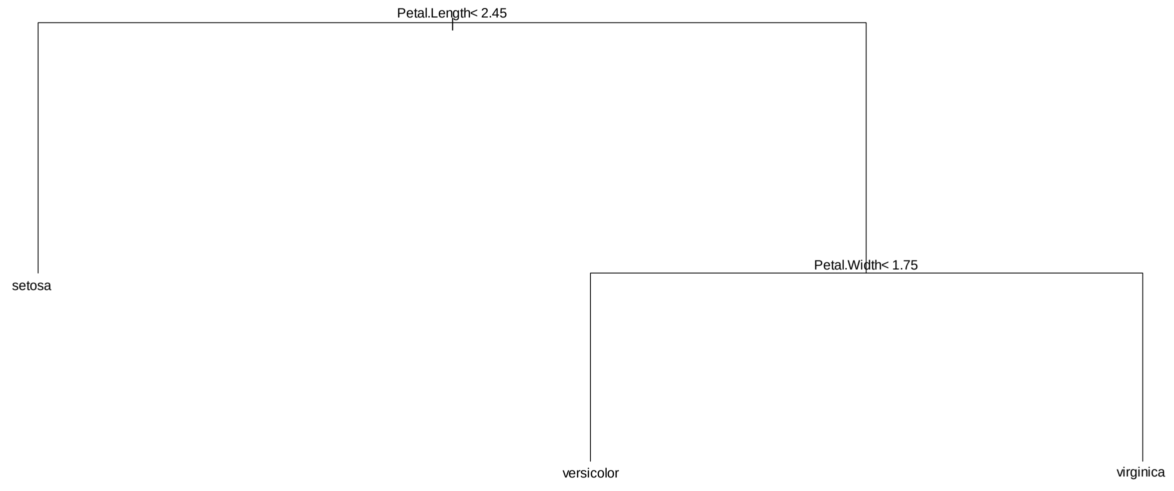
Petal.Length< 2.45
setosa
Petal.Width< 1.75
versicolor
virginica