

EXP NO: 8 IMPLEMENT SVM/DECISION TREE CLASSIFICATION TECHNIQUES**a) SVM**

```
# 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:

The screenshot shows the RStudio interface with the following components:

- Console:** Displays the R code execution output, including the summary of the SVM model, the confusion matrix, and the calculated accuracy of 97.7778%.
- Environment:** Lists the objects created in the environment, including 'iris', 'svm_model', 'test_data', and 'train_data'.
- Files:** Shows a list of files in the current directory, including PDFs, Word documents, and Excel files.

Console Output:

```
R 4.4.1 ~ /...
> set.seed(123)
> sample_indices <- sample(1:nrow(iris), 0.7 * nrow(iris))
> train_data <- iris[sample_indices, ]
> test_data <- iris[-sample_indices, ]
> svm_model <- svm(Species ~ ., data = train_data, kernel = "radial")
> summary(svm_model)

Call:
svm(formula = Species ~ ., data = train_data, kernel = "radial")

Parameters:
  SVM-Type:  C-classification
  SVM-Kernel: radial
            cost: 1

Number of Support Vectors: 45

( 7 18 20 )

Number of Classes: 3

Levels:
setosa versicolor virginica

> predictions <- predict(svm_model, newdata = test_data)
> 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
> accuracy <- sum(diag(confusion_matrix)) / sum(confusion_matrix)
> cat("Accuracy:", accuracy * 100, "%\n")
Accuracy: 97.7778 %
>
```

Environment:

Object	Class	Size
iris	Data	150 obs. of 5 variables
svm_model	Model	List of 31
test_data	Data	45 obs. of 5 variables
train_data	Data	105 obs. of 5 variables
Values		accuracy: 0.977777777777778

b) DECISION TREE

```
# 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: