Implement SVM/Decision tree classification technique

AIM:

To Implement SVM and Decision tree classification techniques using R programming in R Studio.

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:

```
 1   # Install and load the e1071 package (if not already installed)
 2   install.packages("e1071")
 3   library(e1071)
 4   # Load the iris dataset
 5   data(iris)
 6   # Inspect the first few rows of the dataset
 7   head(iris)
 8   # Split the data into training (70%) and testing (30%) sets
 9   set.seed(123) # For reproducibility
10   sample_indices <- sample(1:nrow(iris), 0.7 * nrow(iris))
11   train_data <- iris[sample_indices, ]
12   test_data <- iris[-sample_indices, ]
13   # Fit the SVM model
14   svm_model <- svm(Species ~ ., data = train_data, kernel = "radial")
15   # Print the summary of the model
16   summary(svm_model)
17   # Predict the test set
18   predictions <- predict(svm_model, newdata = test_data)
19   # Evaluate the model's performance
20   confusion_matrix <- table(Predicted = predictions, Actual = test_data$Species)
21   print(confusion_matrix)
22   # Calculate accuracy
23   accuracy <- sum(diag(confusion_matrix)) / sum(confusion_matrix)
24   cat("Accuracy:", accuracy * 100, "%\n")
```

```
package 'proxy' successfully unpacked and MD5 sums checked
package 'e1071' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
        C:\Users\Jayar\AppData\Local\Temp\RtmpsHAtXR\downloaded_packages
            Actual
Predicted    setosa versicolor virginica
  setosa        14          0         0
  versicolor     0         17         0
  virginica      0          1        13
Accuracy: 97.77778 %
```

b) Decision tree in R

```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:

```
 1  # Install and load the rpart package (if not already installed)
 2  install.packages("rpart")
 3  library(rpart)
 4  # Load the iris dataset
 5  data(iris)
 6  # Split the data into training (70%) and testing (30%) sets
 7  set.seed(123) # For reproducibility
 8  sample_indices <- sample(1:nrow(iris), 0.7 * nrow(iris))
 9  train_data <- iris[sample_indices, ]
10  test_data <- iris[-sample_indices, ]
11  # Fit the Decision Tree model
12  tree_model <- rpart(Species ~ ., data = train_data, method = "class")
13  # Print the summary of the model
14  summary(tree_model)
15  # Plot the Decision Tree
16  plot(tree_model)
17  text(tree_model, pretty = 0)
18  # Predict the test set
19  predictions <- predict(tree_model, newdata = test_data, type = "class")
20  # Evaluate the model's performance
21  confusion_matrix <- table(Predicted = predictions, Actual = test_data$Species)
22  print(confusion_matrix)
23  # Calculate accuracy
24  accuracy <- sum(diag(confusion_matrix)) / sum(confusion_matrix)
25  cat("Accuracy:", accuracy * 100, "%\n")
```
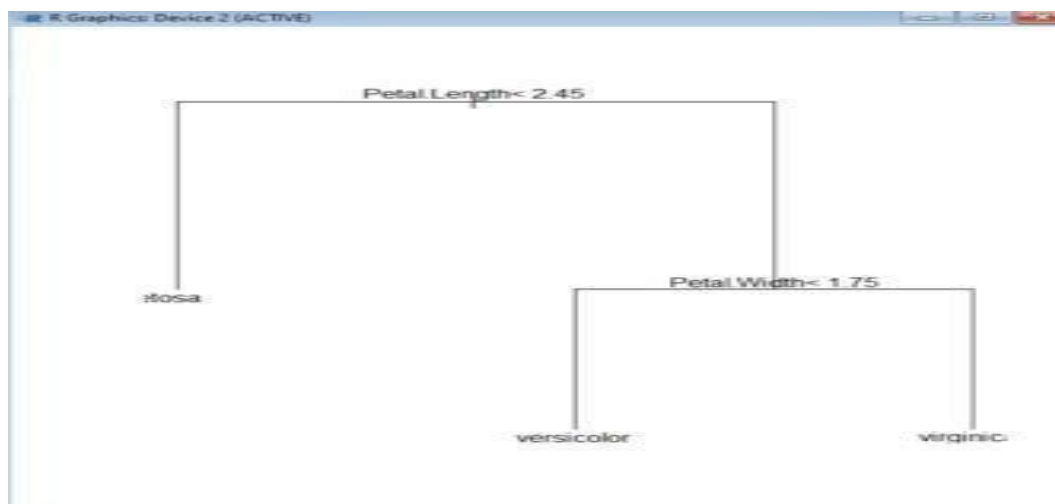
RESULT:

Thus, the Implementation SVM/Decision tree classification techniques using R programming in R Studio.