**Exp.No: 8**

**Implement SVM/Decision tree classification techniques**

**AIM:**

To Implement SVM/Decision tree classification techniques using R.

**PROCEDURE:**

* Load the dataset from sources such as CSV files or databases using suitable libraries.
* Perform data cleaning and preprocessing, including addressing missing values and encoding categorical variables.
* Divide the dataset into training and testing sets to effectively assess model performance.
* Normalize or standardize the features, particularly for SVM, to ensure uniform scaling across inputs.
* Select the appropriate model: use SVM for margin-based classification or Decision Tree for rule-based classification tasks.
* Train the model on the training data using the fit method.
* Generate predictions on the testing data with the predict method.
* Evaluate the model's performance using metrics such as accuracy, confusion matrix, precision, and recall.
* Visualize the outcomes with relevant plots, like decision boundaries for SVM or tree structures for Decision Trees.
* Tune the model by adjusting hyperparameters, such as C for SVM or max\_depth for Decision Trees.

**PROGRAM:**

**SVM.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")

**Decision Tree.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)

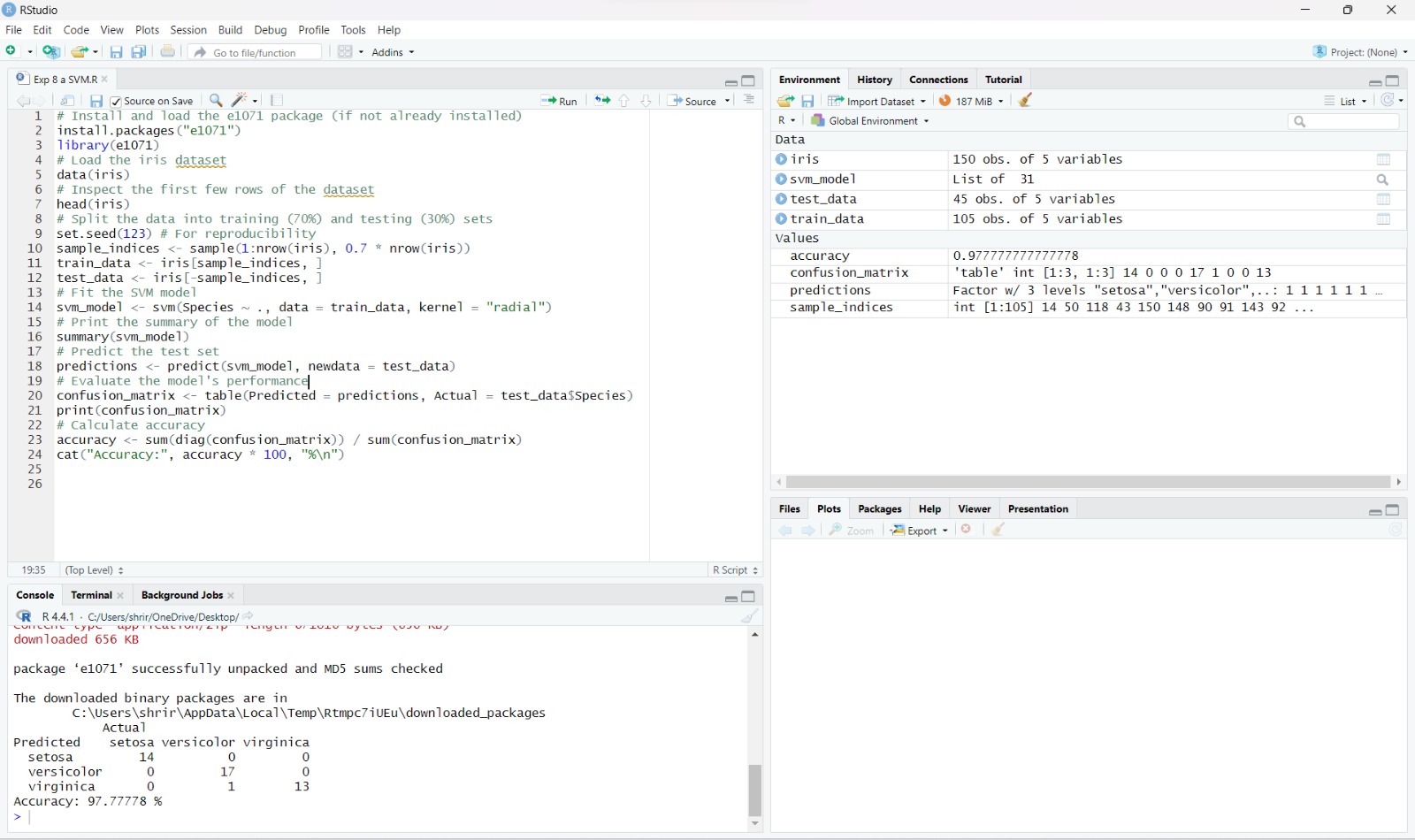
# Calculate accuracy

accuracy <- sum(diag(confusion\_matrix)) / sum(confusion\_matrix)

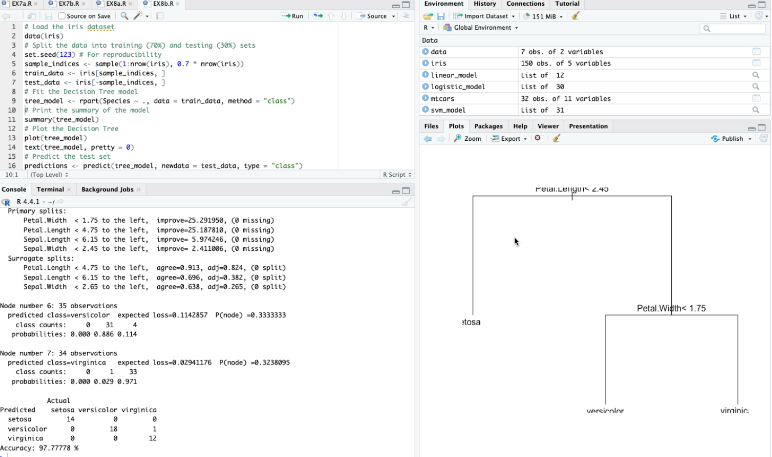
cat("Accuracy:", accuracy \* 100, "%\n")

**OUTPUT:**

**SVM :**

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**Decision tree:**

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**RESULT:**

Thus SVM and Decision tree classification techniques has been successfully executed.