Ex No 8

Implement SVM/Decision tree classification techniques

AIM:

To Implement SVM/Decision tree classification techniques using R.

PROCEDURE:

- Collect and load the dataset from sources like CSV files or databases.
- Clean and preprocess the data, including handling missing values and encoding categorical variables.
- Split the dataset into training and testing sets to evaluate model performance.
- Normalize or standardize the features, especially for SVM, to ensure consistent scaling.
- Choose the appropriate model: SVM for margin-based classification, Decision Tree for rule-based classification.
- Train the model on the training data using the ‘fit’ method.
- Make predictions on the testing data using the ’predict’ method.
- Evaluate the model using metrics like accuracy, confusion matrix, precision, and recall.
- Visualize the results with plots, such as decision boundaries for SVM or tree structures for Decision Trees.
- Fine-tune the model by adjusting hyperparameters like `C` for SVM or `max_depth`

  for Decision Trees.

CODE:

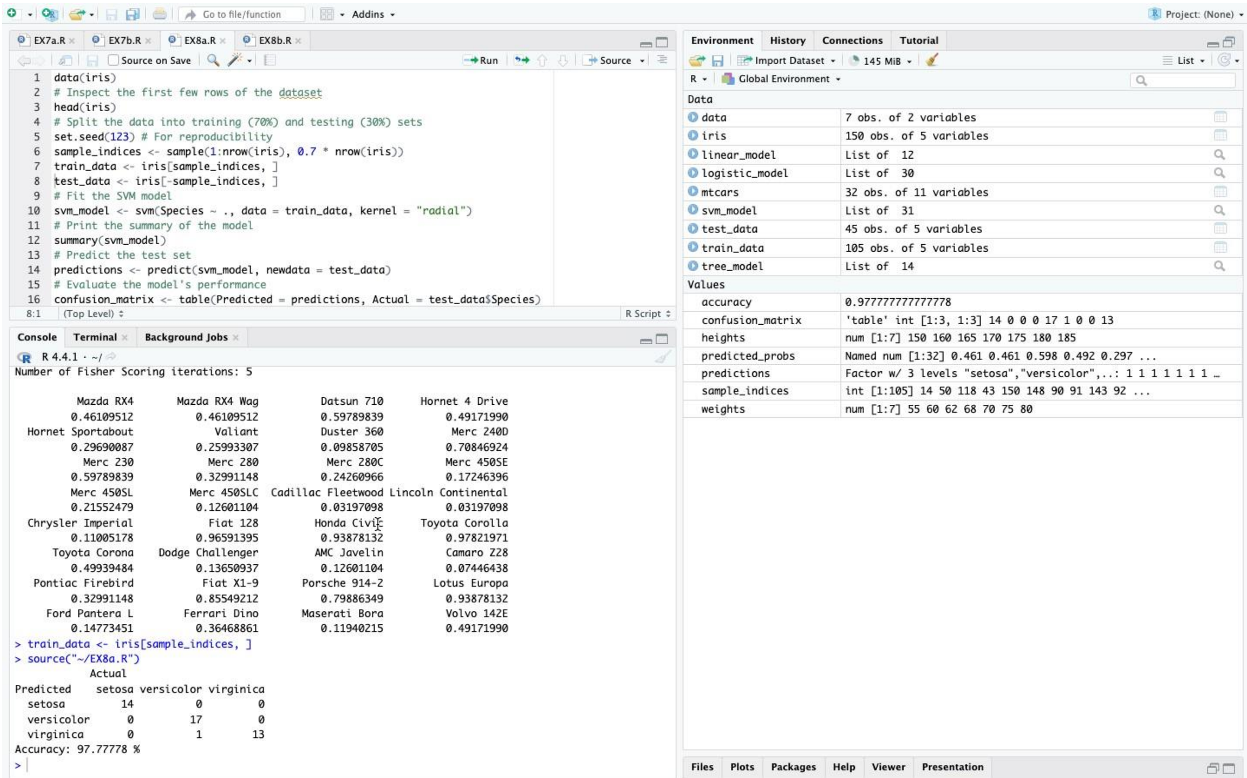
SVM.R:

```
# 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, ]
```

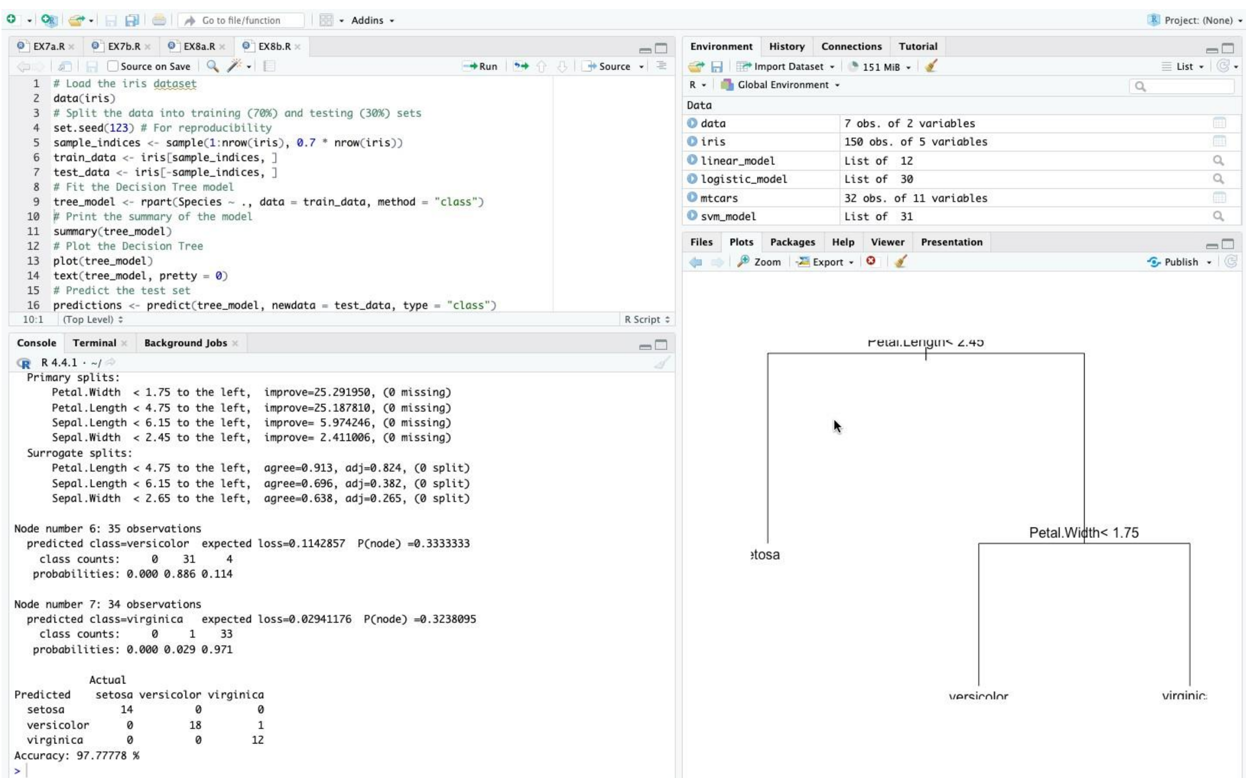
Fit the SVM model svm_model <- svm(Species ~ ., data =
train_data, kernel = "radial")
Print the summary of the model
summary(svm_model) # Predict the test set predictions
<- predict(svm_model, newdata = test_data)
Evaluate the model's performance confusion_matrix <- table(Predicted =
predictions, Actual = 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 in R:



Decision tree:



RESULT:

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