

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 :

```
> 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 :

```
# 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)
```

	Actual		
Predicted	setosa	versicolor	virginica
setosa	14	0	0
versicolor	0	18	1
virginica	0	0	12

