TASK 1 OUTPUT:


```r
1   library(datasets)
2   library(caret)
3   install.packages("randomForest")
4   library(randomForest)
5   library(ggplot2)
6
7   # Loading and preview of dataset
8   data(iris)
9   head(iris)
10  str(iris)
11
12  # Visualize the data: Pair Plot
13
14  pairs(iris[, 1:4], col = iris$Species)
15
16  # Split the data into training and testing sets
17
18  set.seed(42)
19  trainIndex <- createDataPartition(iris$Species, p = 0.8, list = FALSE)
20  trainData <- iris[trainIndex, ]
21  testData <- iris[-trainIndex, ]
22
23  # Train a Random Forest model
```

Console output:
```
> # Visualize the data: Pair Plot
>
> pairs(iris[, 1:4], col = iris$Species)
> install.packages("randomForest")
trying URL 'https://cran.rstudio.com/bin/macosx/big-sur-arm64/contrib/4.3/randomForest_4.7-1.2.t
gz'
Content type 'application/x-gzip' length 257844 bytes (251 KB)
==================================================
downloaded 251 KB


The downloaded binary packages are in
        /var/folders/_9/rlq7mzcx1zsb3b56n1b7hmzw0000gn/T//RtmpGFrN35/downloaded_packages
>
```

```r
15
16  # Split the data into training and testing sets
17
18  set.seed(42)
19  trainIndex <- createDataPartition(iris$Species, p = 0.8, list = FALSE)
20  trainData <- iris[trainIndex, ]
21  testData <- iris[-trainIndex, ]
22
23  # Train a Random Forest model
24
25  set.seed(42)
26  rf_model <- randomForest(Species ~ ., data = trainData, importance = TRUE)
27
28  # Print model summary and plotting variable importance
29
30  print(rf_model)
31  varImpPlot(rf_model)
32
33  # Make predictions on the test data
34
35  predictions <- predict(rf_model, testData)
36
```

Console output:
```
> print(rf_model)

Call:
 randomForest(formula = Species ~ ., data = trainData, importance = TRUE)
               Type of random forest: classification
                     Number of trees: 500
No. of variables tried at each split: 2

        OOB estimate of  error rate: 3.33%
Confusion matrix:
           setosa versicolor virginica class.error
setosa         40          0         0        0.00
versicolor      0         38         2        0.05
virginica       0          2        38        0.05
> varImpPlot(rf_model)
>
```

```r
28  # Print model summary and plotting variable importance
29
30  print(rf_model)
31  varImpPlot(rf_model)
32
33  # Make predictions on the test data
34
35  predictions <- predict(rf_model, testData)
36
37  # Evaluate the model
38
39  confusionMatrix(predictions, testData$Species)
40
41  # Visualize the predictions using a scatter plot
42
43  ggplot(testData, aes(x = Petal.Length, y = Petal.Width, color = Species)) +
44      geom_point(size = 3) +
45      geom_point(aes(shape = predictions), size = 3, alpha = 0.5) +
46      labs(title = "True vs Predicted Species",
47           x = "Petal Length",
48           y = "Petal Width") +
49      theme_minimal()
```

49:18   (Top Level)   R Script

Console   Terminal   Background Jobs

R 4.3.2 · /

```
Neg Pred Value          1.0000          0.9500          0.9500
Prevalence              0.3333          0.3333          0.3333
Detection Rate          0.3333          0.3000          0.3000
Detection Prevalence    0.3333          0.3333          0.3333
Balanced Accuracy       1.0000          0.9250          0.9250
>
> # Visualize the predictions using a scatter plot
>
> ggplot(testData, aes(x = Petal.Length, y = Petal.Width, color = Species)) +
+     geom_point(size = 3) +
+     geom_point(aes(shape = predictions), size = 3, alpha = 0.5) +
+     labs(title = "True vs Predicted Species",
+          x = "Petal Length",
+          y = "Petal Width") +
+     theme_minimal()
>
```

Environment   History   Connections   Tutorial

Import Dataset   292 MiB

R   Global Environment

Data

iris	150 obs. of 5 variables	
rf_model	List of 19	
testData	30 obs. of 5 variables	
trainData	120 obs. of 5 variables	
trainIndex	int [1:120, 1] 1 2 3 4 5 7 8 10 11 12 ...	

Values

predictions	Factor w/ 3 levels "setosa","versicolor",..: 1 1 1 1 …

Files   **Plots**   Packages   Help   Viewer   Presentation

Zoom   Export   Publish

True vs Predicted Species

Species
- setosa
- versicolor
- virginica

predictions
- setosa
- versicolor
- virginica