Ex No 7

Implement Linear and Logistic Regression in R

AIM:

To Implement Linear and Logistic Regression 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 to ensure consistent scaling. 5.Choose the appropriate model: Linear Regression for continuous outcomes. ● 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 Mean Squared Error (MSE) for Linear Regression or accuracy and confusion matrix for Logistic Regression.
- Visualize the results with plots, such as scatter plots for Linear Regression or decision boundaries for Logistic Regression.
- Fine-tune the model by adjusting hyperparameters or applying regularization Techniques.

CODE:

LinearRegression.R:

```
# Sample data heights <- c(150, 160, 165, 170,
175, 180, 185) weights <- c(55, 60, 62, 68, 70,
75, 80)
# Create a data frame data <- data.frame(heights,
weights) # Fit a linear regression model
linear_model <- lm(weights ~ heights, data = data)
# Print the summary of the model
print(summary(linear_model)) # Plotting the data
and regression line plot(data$heights,
data$weights, main = "Linear Regression: Weight
```

```
vs. Height", xlab = "Height (cm)", ylab = "Weight
(kg)", pch = 19, col = "blue")
# Add regression line
abline(linear_model, col = "red", lwd = 2)
```

LogisticRegression.R:

```
# Load the dataset
data(mtcars)
# Convert 'am' to a factor (categorical variable) mtcars$am <- factor(mtcars$am,
levels = c(0, 1), labels = c("Automatic", "Manual"))
# Fit a logistic regression model logistic_model <- glm(am ~ mpg,
data = mtcars, family = binomial)
# Print the summary of the model
print(summary(logistic_model)) # Predict probabilities for
the logistic model predicted_probs <- predict(logistic_model,
type = "response")
# Display the predicted probabilities
print(predicted_probs)
# Plotting the data and logistic regression curve
plot(mtcars$mpg, as.numeric(mtcars$am) - 1,
    main = "Logistic Regression: Transmission vs. MPG", xlab =
"Miles Per Gallon (mpg)", ylab = "Probability of Manual
Transmission", pch = 19, col = "blue") # Add the logistic regression
curve curve(predict(logistic_model, data.frame(mpg = x), type =
"response"), add = TRUE, col = "red", lwd = 2)
```

OUTPUT:

Linear Regression:

```r
# Sample data
heights <- c(150, 160, 165, 170, 175, 180, 185)
weights <- c(55, 60, 62, 68, 70, 75, 80)
# Create a data frame
data <- data.frame(heights, weights)
# Fit a linear regression model
linear_model <- lm(weights ~ heights, data = data)
# Print the summary of the model
print(summary(linear_model))
# Plotting the data and regression line
plot(data$heights, data$weights,
     main = "Linear Regression: Weight vs. Height",
     xlab = "Height (cm)",
     ylab = "Weight (kg)",
     pch = 19, col = "blue")
# Add regression line
abline(linear_model, col = "red", lwd = 2)
```

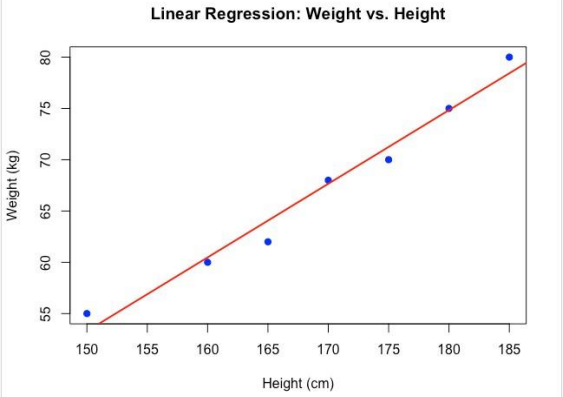
```
  versicolor      0         18         1
  virginica       0          0        12
Accuracy: 97.77778 %
>
> source("~/EX7a.R")

Call:
lm(formula = weights ~ heights, data = data)

Residuals:
      1       2       3       4       5       6       7
 1.7049 -0.4754 -2.0656  0.3443 -1.2459  0.1639  1.5738

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -54.40984    8.74376  -6.223  0.00157 **
heights       0.71803    0.05154  13.932 3.42e-05 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.521 on 5 degrees of freedom
Multiple R-squared:  0.9749,    Adjusted R-squared:  0.9699
F-statistic: 194.1 on 1 and 5 DF,  p-value: 3.424e-05
```



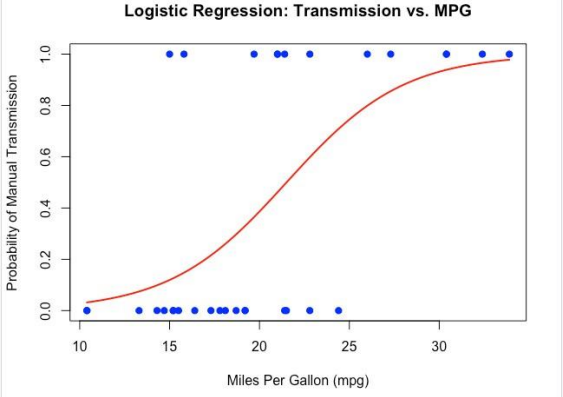
Logistic Regression:

```r
# Fit a logistic regression model
logistic_model <- glm(am ~ mpg, data = mtcars, family = binomial)
# Print the summary of the model
print(summary(logistic_model))
# Predict probabilities for the logistic model
predicted_probs <- predict(logistic_model, type = "response")
# Display the predicted probabilities
print(predicted_probs)
# Plotting the data and logistic regression curve
plot(mtcars$mpg, as.numeric(mtcars$am) - 1,
     main = "Logistic Regression: Transmission vs. MPG",
     xlab = "Miles Per Gallon (mpg)",
     ylab = "Probability of Manual Transmission",
     pch = 19, col = "blue")
# Add the logistic regression curve
curve(predict(logistic_model, data.frame(mpg = x), type = "response"),
      add = TRUE, col = "red", lwd = 2)
```

```
    Null deviance: 43.230  on 31  degrees of freedom
Residual deviance: 29.675  on 30  degrees of freedom
AIC: 33.675

Number of Fisher Scoring iterations: 5

          Mazda RX4       Mazda RX4 Wag          Datsun 710      Hornet 4 Drive
         0.46109512          0.46109512          0.59789839          0.49171990
  Hornet Sportabout             Valiant           Duster 360            Merc 240D
         0.29690087          0.25993307          0.09858705          0.70846924
           Merc 230            Merc 280            Merc 280C           Merc 450SE
         0.59789839          0.32991148          0.24260966          0.17246396
          Merc 450SL         Merc 450SLC  Cadillac Fleetwood Lincoln Continental
         0.21552479          0.12601104          0.03197098          0.03197098
  Chrysler Imperial            Fiat 128         Honda Civic      Toyota Corolla
         0.11005178          0.96591395          0.93878132          0.97821971
       Toyota Corona     Dodge Challenger          AMC Javelin           Camaro Z28
         0.49939484          0.13650937          0.12601104          0.07446438
    Pontiac Firebird           Fiat X1-9       Porsche 914-2        Lotus Europa
         0.32991148          0.85549212          0.79886349          0.93878132
       Ford Pantera L      Ferrari Dino       Maserati Bora          Volvo 142E
         0.14773451          0.36468861          0.11940215          0.49171990
```



RESULT:

Thus to Implement Linear and Logistic Regression using R has been successfully executed.