

Exp. No : 7

Implementing Linear and Logistic Regression

a) Linear Regression

```
# 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)
```

Output:

```

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R 4.4.1 ~ /
> data(mtcars)
> mtcars$am <- factor(mtcars$am, levels = c(0, 1), labels = c("Automatic", "Manual"))
> logistic_model <- glm(am ~ mpg, data = mtcars, family = binomial)
> print(summary(logistic_model))

Call:
glm(formula = am ~ mpg, family = binomial, data = mtcars)

Coefficients:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  -6.6035     2.3514  -2.808  0.00498 **
mpg             0.3070     0.1148   2.673  0.00751 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

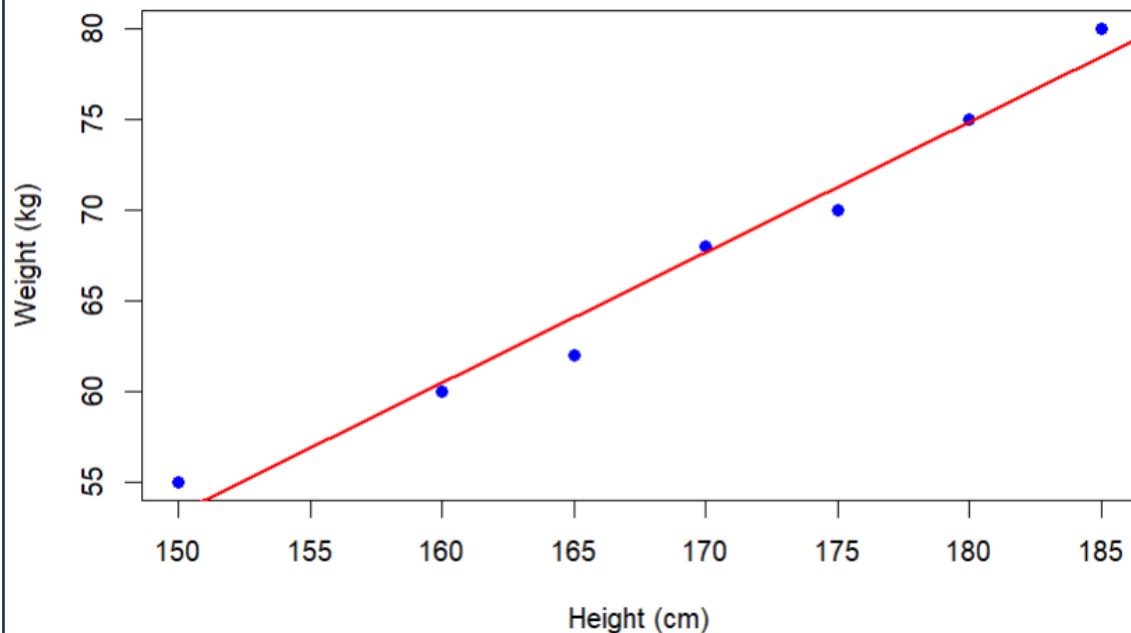
    Null deviance: 43.230  on 31  degrees of freedom
Residual deviance: 29.675  on 30  degrees of freedom
AIC: 33.675

Number of Fisher Scoring iterations: 5

> predicted_probs <- predict(logistic_model, type = "response")
> print(predicted_probs)
      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

```

Linear Regression: Weight vs. Height



b) Logistic Regression

```
# 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:

```

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R 4.4.1: ~/...
glm(<model> ~ mpg, family = binomial, data = mtcars)

Coefficients:
            Estimate Std. Error z value Pr(>|z|)
(Intercept) -6.6035      2.3514  -2.808  0.00498 **
mpg          0.3070      0.1148   2.673  0.00751 **
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0.14773451      0.36468861      0.11940215      0.49171990

> plot(mtcars$mpg, as.numeric(mtcars$am) - 1,
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+

```

