**SAVEETHA SCHOOL OF ENGINEERING**

**SAVEETHA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCES**

**ITA 0443 - STATISTICS WITH R PROGRAMMING FOR REAL TIME PROBLEM**

**DAY 4– LAB MANUAL**

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**LINEAR REGRESSION ANALYSIS IN R**

**Exercise**

1. Using linear regression analysis establish a relationship between height and weight of a person using the input vector given below.

# Values of height

151, 174, 138, 186, 128, 136, 179, 163, 152, 131

# Values of weight.

63, 81, 56, 91, 47, 57, 76, 72, 62, 48

Predict the weight of a person with height 170. Visualize the regression graphically.

PROGRAM:

> height <- c(151, 174, 138, 186, 128, 136, 179, 163, 152, 131)

> weight <- c(63, 81, 56, 91, 47, 57, 76, 72, 62, 48)

> relation <- lm(weight ~ height)

> print(relation)

Call:

lm(formula = weight ~ height)

Coefficients:

(Intercept) height

-38.4551 0.6746

> print(summary(relation))

Call:

lm(formula = weight ~ height)

Residuals:

Min 1Q Median 3Q Max

-6.3002 -1.6629 0.0412 1.8944 3.9775

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -38.45509 8.04901 -4.778 0.00139 \*\*

height 0.67461 0.05191 12.997 1.16e-06 \*\*\*

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 3.253 on 8 degrees of freedom

Multiple R-squared: 0.9548, Adjusted R-squared: 0.9491

F-statistic: 168.9 on 1 and 8 DF, p-value: 1.164e-06

> a <- data.frame(height = 170)

> result <- predict(relation, a)

> print(result)

1

76.22869

> png(file = "linearregression.png")

> plot(height, weight, col = "blue", main = "Height & Weight Regression", abline(lm(weight ~ height)), cex =

+ 1.3, pch = 16, xlab = "Height in cm", ylab = "Weight in kg")

> dev.off()

1. Download the Dataset "water" From Rdataset Link.Find out whether there is a linear relation between attributes"mortality" and"hardness" by plot function.Fit the Data into the Linear Regression model.Predict the mortality for the hardness=88

**MULTIPLE REGRESSION ANALYSIS IN R**

**Exercise:**

3.Generate a multiple regression model using the built in dataset mtcars.It gives a comparison between different car models in terms of mileage per gallon (mpg), cylinder displacement("disp"), horse power("hp"), weight of the car("wt") and some more parameters.

Establish the relationship between "mpg" as a response variable with "disp","hp" and "wt" as predictor variables. Predict the mileage of the car with dsp=221,hp=102 and wt=2.91.

PROGRAM:

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| --- |
| > data(mtcars)  >  > model <- lm(mpg ~ disp + hp + wt, data = mtcars)  > summary(model)  Call:  lm(formula = mpg ~ disp + hp + wt, data = mtcars)  Residuals:  Min 1Q Median 3Q Max  -3.891 -1.640 -0.172 1.061 5.861  Coefficients:  Estimate Std. Error t value Pr(>|t|)  (Intercept) 37.105505 2.110815 17.579 < 2e-16 \*\*\*  disp -0.000937 0.010350 -0.091 0.92851  hp -0.031157 0.011436 -2.724 0.01097 \*  wt -3.800891 1.066191 -3.565 0.00133 \*\*  ---  Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1  Residual standard error: 2.639 on 28 degrees of freedom  Multiple R-squared: 0.8268, Adjusted R-squared: 0.8083  F-statistic: 44.57 on 3 and 28 DF, p-value: 8.65e-11  > newdata <- data.frame(disp = 221, hp = 102, wt = 2.91)  > prediction <- predict(model, newdata = newdata)  > prediction  1  22.65987 |
|  |
|  |

4. Consider the data set "delivery" available in the R environment. It gives a deliverytime (“delTime”)of production materials(number of productions “n.prod”) with the given distance(“distance”) to reach the destination place.

a)Create the model to establish the relationship between "delTime" as a response variable with "n.prod" and "distance" as predictor variables.

b)Predict the delTime for the given number of production(“n.prod”)=9 and distance(“distance”)=450