Regressin

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**Linear Regression**

#Linear regressin is used topredict the value of an outcome variable y on the basis of one or more imput vaiables x.ie it is used toestablish linear relationship betweenresponse and predictor variable.

#y=mx+b

#Syntax

#lm(formula,data)

#**Formula**-is the symbol that represents relation between x and y.

#**Data**-is a vector on which we will apply the formula.

**Creating Relationship model and Getting Coefficients**

x <- c(141,134,178,156,108,116,119,143,162,130)  
y <- c(62,85,56,21,47,17,76,92,62,58)  
#applying lm() function  
model <- lm(y~x)  
model

##   
## Call:  
## lm(formula = y ~ x)  
##   
## Coefficients:  
## (Intercept) x   
## 47.50833 0.07276

#summary of the model  
summary(model)

##   
## Call:  
## lm(formula = y ~ x)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -38.948 -7.390 1.869 15.933 34.087   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)  
## (Intercept) 47.50833 55.18118 0.861 0.414  
## x 0.07276 0.39342 0.185 0.858  
##   
## Residual standard error: 25.96 on 8 degrees of freedom  
## Multiple R-squared: 0.004257, Adjusted R-squared: -0.1202   
## F-statistic: 0.0342 on 1 and 8 DF, p-value: 0.8579

**The Predict() Function**

#predict(object,newdata)

#**Object**-is the formula that we have already predicted using the lm() function

#**NewData**-is the vector that contains the new value for predictor variable.

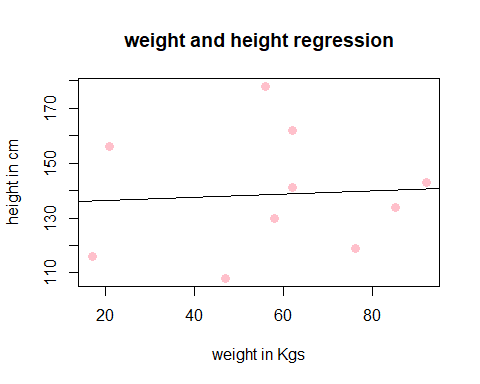
#Finding weight for person with height 170.

z <- data.frame(x=160)  
predictr <-predict(model,z)   
predictr

## 1   
## 59.14977

#**plotting Regression**

plot(y,x,col="pink",main = "weight and height regression",abline(lm(x~y)),cex=1.3,pch=16,xlab = "weight in Kgs",ylab = "height in cm")



**MULTIPLE LINEAR REGRESSION**

#used to predict outcome variable (y) based on multiple distinct variables.

#y=b0+b1*x1+b2*x2+b3\*x3…..bnxn

#The b value represents regression weight.They measure association between outcome and predictor variable.

#**Y**-response variable.

#**b0,b1,b2,b3…,bn**-coefficients

#**x1,x2,x3,….xn**-predictor vaiables

#Syntax

#lm(y~x1+x2+x3+…..xn,data)

data <-mtcars   
data

## mpg cyl disp hp drat wt qsec vs am gear carb  
## Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4  
## Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4  
## Datsun 710 22.8 4 108.0 93 3.85 2.320 18.61 1 1 4 1  
## Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1  
## Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2  
## Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1  
## Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4  
## Merc 240D 24.4 4 146.7 62 3.69 3.190 20.00 1 0 4 2  
## Merc 230 22.8 4 140.8 95 3.92 3.150 22.90 1 0 4 2  
## Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4  
## Merc 280C 17.8 6 167.6 123 3.92 3.440 18.90 1 0 4 4  
## Merc 450SE 16.4 8 275.8 180 3.07 4.070 17.40 0 0 3 3  
## Merc 450SL 17.3 8 275.8 180 3.07 3.730 17.60 0 0 3 3  
## Merc 450SLC 15.2 8 275.8 180 3.07 3.780 18.00 0 0 3 3  
## Cadillac Fleetwood 10.4 8 472.0 205 2.93 5.250 17.98 0 0 3 4  
## Lincoln Continental 10.4 8 460.0 215 3.00 5.424 17.82 0 0 3 4  
## Chrysler Imperial 14.7 8 440.0 230 3.23 5.345 17.42 0 0 3 4  
## Fiat 128 32.4 4 78.7 66 4.08 2.200 19.47 1 1 4 1  
## Honda Civic 30.4 4 75.7 52 4.93 1.615 18.52 1 1 4 2  
## Toyota Corolla 33.9 4 71.1 65 4.22 1.835 19.90 1 1 4 1  
## Toyota Corona 21.5 4 120.1 97 3.70 2.465 20.01 1 0 3 1  
## Dodge Challenger 15.5 8 318.0 150 2.76 3.520 16.87 0 0 3 2  
## AMC Javelin 15.2 8 304.0 150 3.15 3.435 17.30 0 0 3 2  
## Camaro Z28 13.3 8 350.0 245 3.73 3.840 15.41 0 0 3 4  
## Pontiac Firebird 19.2 8 400.0 175 3.08 3.845 17.05 0 0 3 2  
## Fiat X1-9 27.3 4 79.0 66 4.08 1.935 18.90 1 1 4 1  
## Porsche 914-2 26.0 4 120.3 91 4.43 2.140 16.70 0 1 5 2  
## Lotus Europa 30.4 4 95.1 113 3.77 1.513 16.90 1 1 5 2  
## Ford Pantera L 15.8 8 351.0 264 4.22 3.170 14.50 0 1 5 4  
## Ferrari Dino 19.7 6 145.0 175 3.62 2.770 15.50 0 1 5 6  
## Maserati Bora 15.0 8 301.0 335 3.54 3.570 14.60 0 1 5 8  
## Volvo 142E 21.4 4 121.0 109 4.11 2.780 18.60 1 1 4 2

head(data)

## mpg cyl disp hp drat wt qsec vs am gear carb  
## Mazda RX4 21.0 6 160 110 3.90 2.620 16.46 0 1 4 4  
## Mazda RX4 Wag 21.0 6 160 110 3.90 2.875 17.02 0 1 4 4  
## Datsun 710 22.8 4 108 93 3.85 2.320 18.61 1 1 4 1  
## Hornet 4 Drive 21.4 6 258 110 3.08 3.215 19.44 1 0 3 1  
## Hornet Sportabout 18.7 8 360 175 3.15 3.440 17.02 0 0 3 2  
## Valiant 18.1 6 225 105 2.76 3.460 20.22 1 0 3 1

**Creating relation model and finding coefficients**

imput <- mtcars

model1 <- lm(mpg~wt+disp+hp,data=imput)  
model1

##   
## Call:  
## lm(formula = mpg ~ wt + disp + hp, data = imput)  
##   
## Coefficients:  
## (Intercept) wt disp hp   
## 37.105505 -3.800891 -0.000937 -0.031157

b0 <- coef(model)[1]  
b0

## (Intercept)   
## 47.50833

x\_wt <- coef(model)[2]  
x\_wt

## x   
## 0.07275901

x\_disp <- coef(model)[3]  
x\_disp

## <NA>   
## NA

x\_hp <- coef(model)[4]  
x\_hp

## <NA>   
## NA