**Linear Regression**

**Linear Regression** is used to model the relationship between dependent variables and one or more independent variables.

* **Simple linear regression**

Models the relationship between on dependent variables and one independent variables.

intercepts value of Y when x =0

slope (change in y for a one unit change in X)

E = error term (predicted value – actual value)

X = independent variable (predictor)

Y = Dependent Variable (what we are predicting )

How to calculate

How to calculate

* **Multiple Linear Regression**

Model more complex relationships where the dependent variable y is influenced with multiple factors

is a dependent Variable what we are predicted

X1, X2, Xn are independent variables which we also known as predictors

is intercept

, *,* are coefficients for each predictors

**Steps to compute Regression coefficients**

We calculate the regression coefficients with the help of matrix

* is (n X p) design matrix
* is coefficient matrix (p X 1)

**R2**(coefficient of determination) measured how well the model explains the variance in the dependent variables.

Actual observed values of Dependent Variables

Predicted values of the dependent variables from the model

Mean of the actual observed values of the dependent variables.

n is number of observations

Interpretation

R2 = 1 Prefect fit model explains 100% of variance in the dependent variable

R2 = 0 No fit model doesn’t explain any of variance in dependent variable.

0< R2 <1 the model explains some but not at all of the variance in dependent variable.

The value closer to 1 the better the model fits the data.

**Adjusted**