What is Covariance

Covariance measures the total variation of two variables from their Arithmetic mean. i.e. how much two variables vary from there mean.

Using the covariance we can see the direction of the variable where they are moving, like in upward or downward direction.

The formula to calculate covariance is given below,

$$Cov_{x,y} = \frac{\sum(Xi-xbar)*(Yi-Ybar)}{N-1}$$

What is Correlation

Correlation coefficient is a statistical measure that calculates the strength of the relationship between two variables. In order to determine the relationship between two variables we need to study the Correlation.

Correlation coefficient is a measure of degree of extent relationship between two variables let's say X and y.

Correlation is denoted by r and is given by

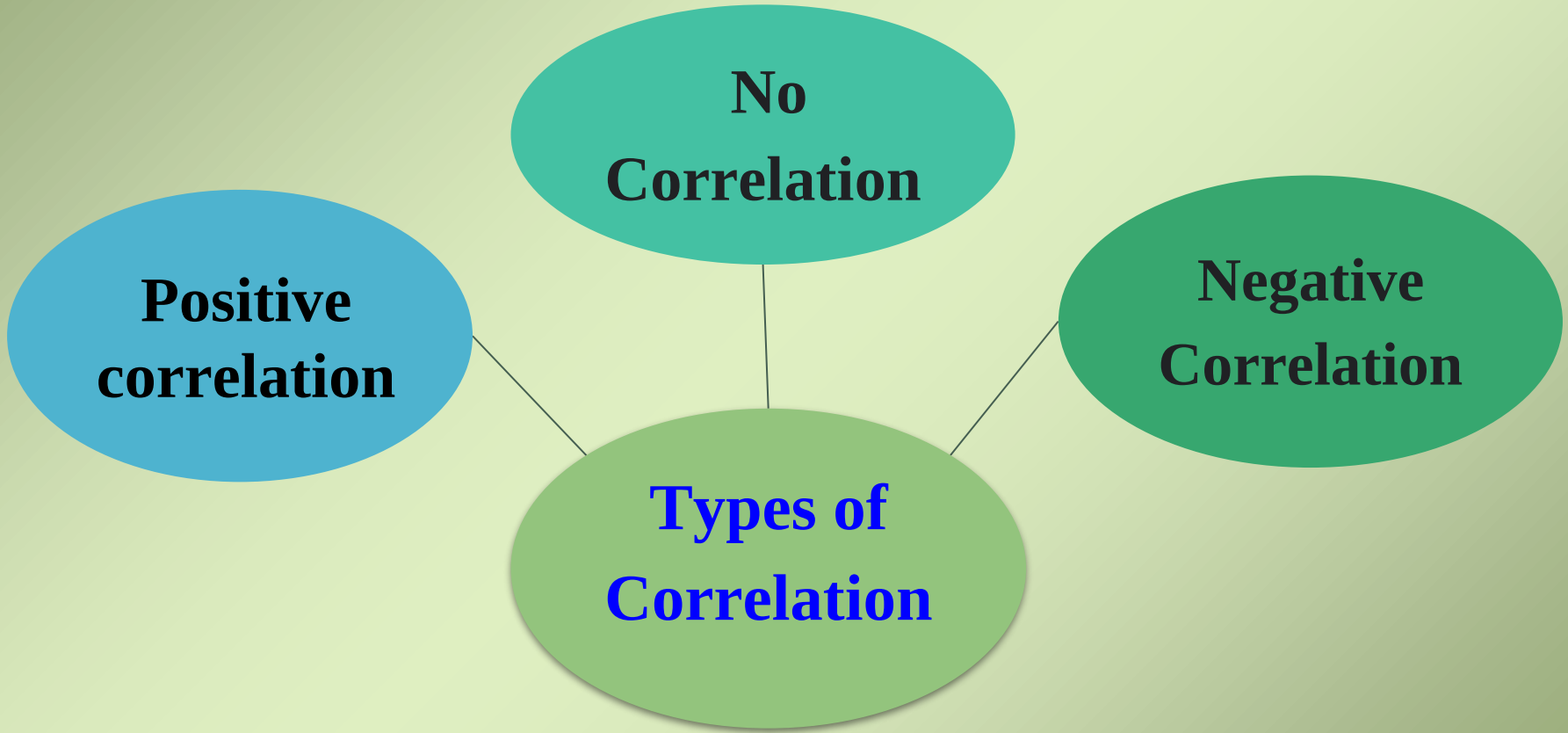
$$r = \frac{cov(X,Y)}{\sigma x * \sigma y}$$

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[\, n\Sigma x^2 - (\Sigma x)^2 \,][\, n\Sigma y^2 - (\Sigma y)^2 \,]}}$$

Correlation always lies between -1 and +1.

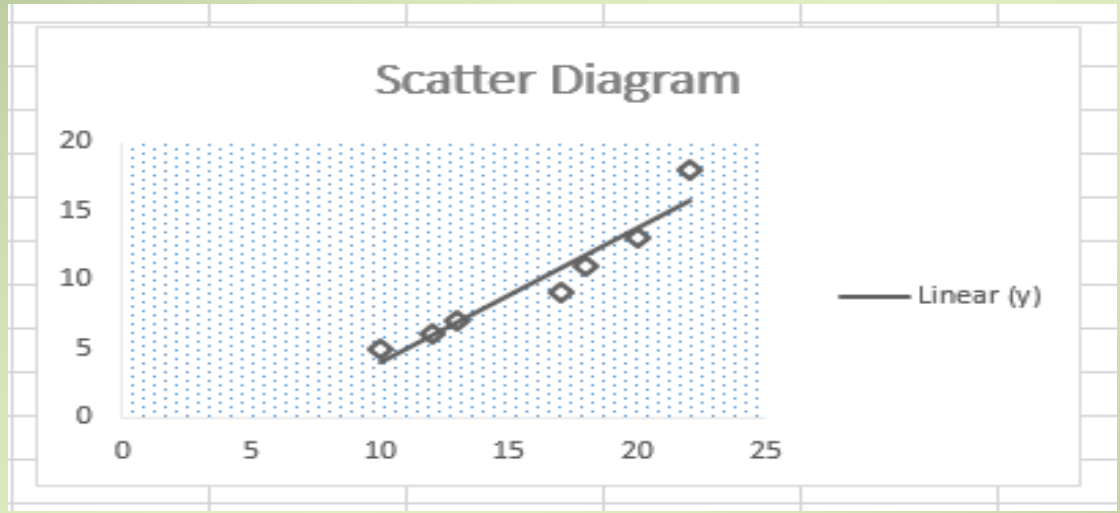
- When the correlation coefficient is **close to +1**, Then we say that there is **positive correlation** between the two variables.
- If the value is **close to -1**, Then we say that there is a **negative correlation** between the two variables.
- When the value is **close to zero,** Then we say that there is **no relationship** between the two variables.

Types of Correlation

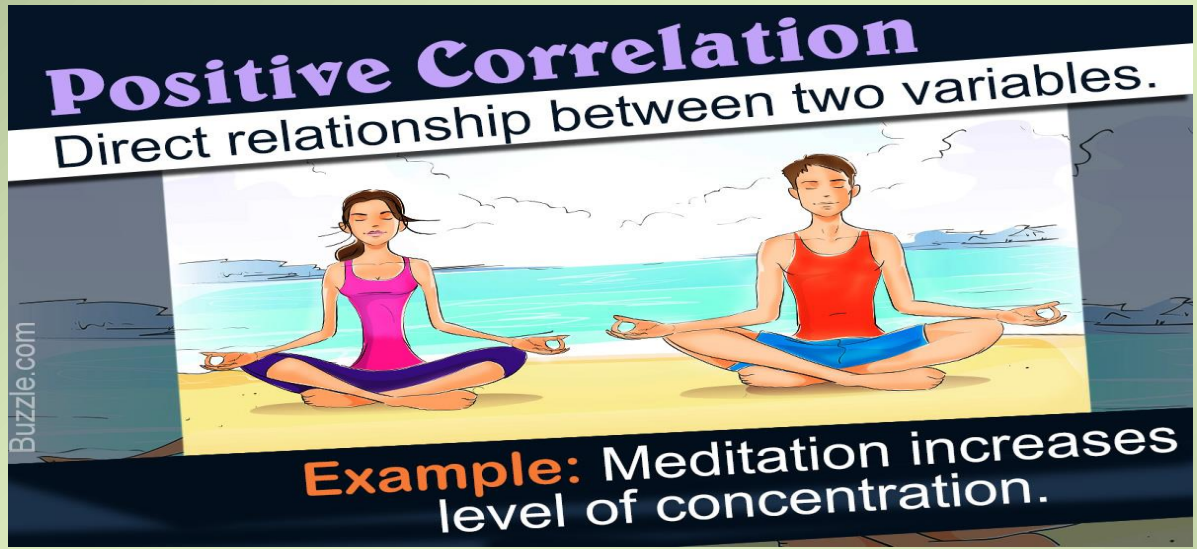


Positive Correlation

If the values of the variable increases or decreases in the same direction then we say that there is positive correlation between the two variables.
E.g. Sales and profit, Study hrs. And marks etc.



Positive Correlation

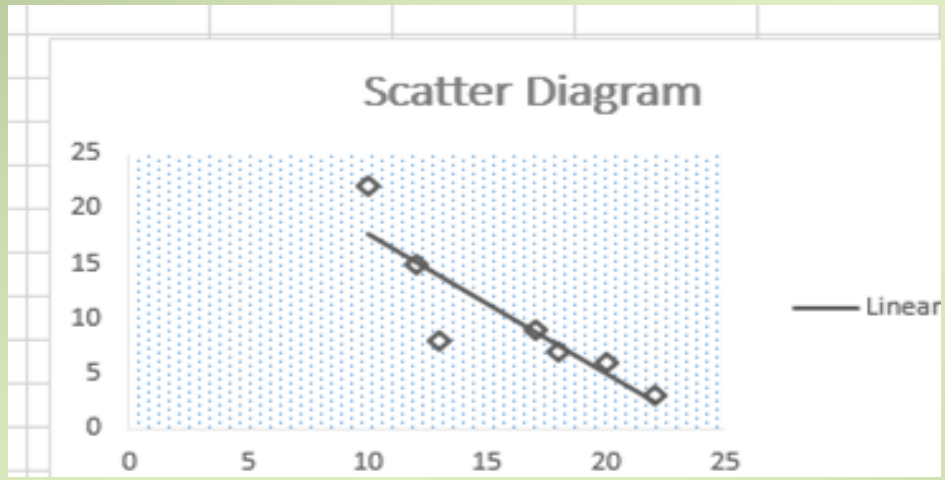


Negative Correlation

If the values of the variable changes in the opposite direction i.e.If one variable increases then other variable decreases and vice-versa then we say that there is positive correlation between the two variables.

E.g. 1.The more one smokes cigarettes, the fewer years she will have to live.

2.The more vitamins one takes, the less likely one is to have a deficiency



No Correlation

If the change in value of one variable is not associated with the change in value of another variable then we say that there is no correlation between the two variables.

E.g. Rainfall and marks of the students, Price of the sugar and sell of umbrella