Definition of Correlation

- Correlation is the degree of association between two or more variables.
- If two or more quantities vary so that movements in one tend to be accompanied by movements in other, then they are said to be correlated.
- Coefficient of correlation is a numerical measure of the degree of association between two or more variables.

Meaning

- Correlation is the most popular statistical measure that indicates the relationship between two or more variables.
- It is concerned with finding:
  - Whether or not the relationship exist?
  - Degree of the correlation?
  - Direction of relationship within the variables (Direct or indirect)?
  - Relationship is strong or Weak?

Examples

- Relationship between income and years of experience
- Relationship between amount of rainfall and yield of rice
- Relationship between price and demand of a commodity
- Relationship between nature of work and motivation to work
- Relationship between height and weight

Types of Correlation

Correlation on the basis of direction of change is as following:

(1) Positive Correlation
(2) Negative Correlation
(3) Perfectly Positive Correlation
(4) Perfectly Negative Correlation
(5) Zero Correlation

Positive Correlation

- When two variables move in the same direction then the correlation between these two variables is said to be PositiveCorrelation.

- When the value of one variable increases, the value of other value also increases at the same rate.

For example :

Training(Rs.)	:	350	360	370	380
performance(Kg.)	:	30	40	50	60

Negative Correlation

- In this type of correlation, the two variables move in the opposite direction.
- When the value of one variable increases, the value of the other variable decreases.

  For example, the relationship between price and demand.

Perfect Positive Correlation

- When there is a change in one variable X, and if there is equal proportion of change in the other variable say Y in the same direction, then these two variables are said to have a Perfect Positive Correlation.

Perfectly Negative Correlation

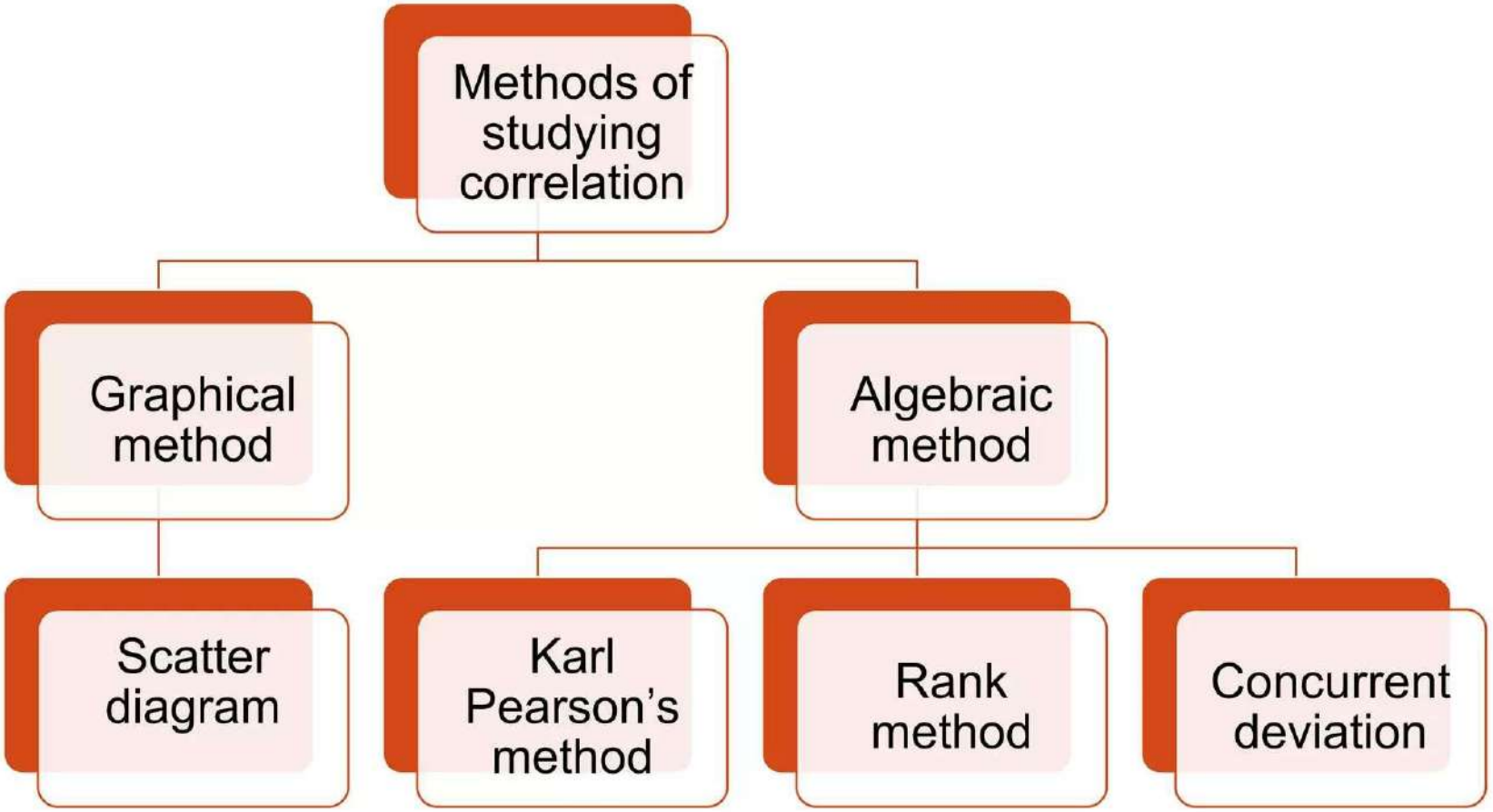
- Between two variables X and Y, if the change in X causes the same amount of change in Y in equal proportion but in opposite direction, then this correlation is called as Perfectly Negative Correlation.

Zero Correlation

- When the two variables are independent and the change in one variable has no effect in other variable,

  then the correlation between these two variable is known as Zero Correlation.

Methods of studying correlation



Karl Pearson's Coefficient of Correlation

- It is the most widely used method of measuring linear relationship between two variables.

- Assumptions of Karl Pearson's Coefficient:

1. There is linear relationship between variables.
2. There is cause and effect relationship

Calculating the Co-efficient of Correlation by Karl Pearson Method

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

Where:

N	=	number of pairs of scores
Σxy	=	sum of the products of paired scores
Σx	=	sum of x scores
Σy	=	sum of y scores
Σx^2	=	sum of squared x scores
Σy^2	=	sum of squared y scores

Features of coefficient of correlation

- Ranges between -1 and 1.
- Closer to -1, stronger the negative relationship
- Closer to 1, stronger the positive relationship
- Closer to 0, weaker the relationship
- If r=0 there is no relationship between variable
- If $+0.75 \leq r \leq +1$ there exist high positive relationship.
- If $-0.75 \geq r \geq -1$ there exist high negative relationship.