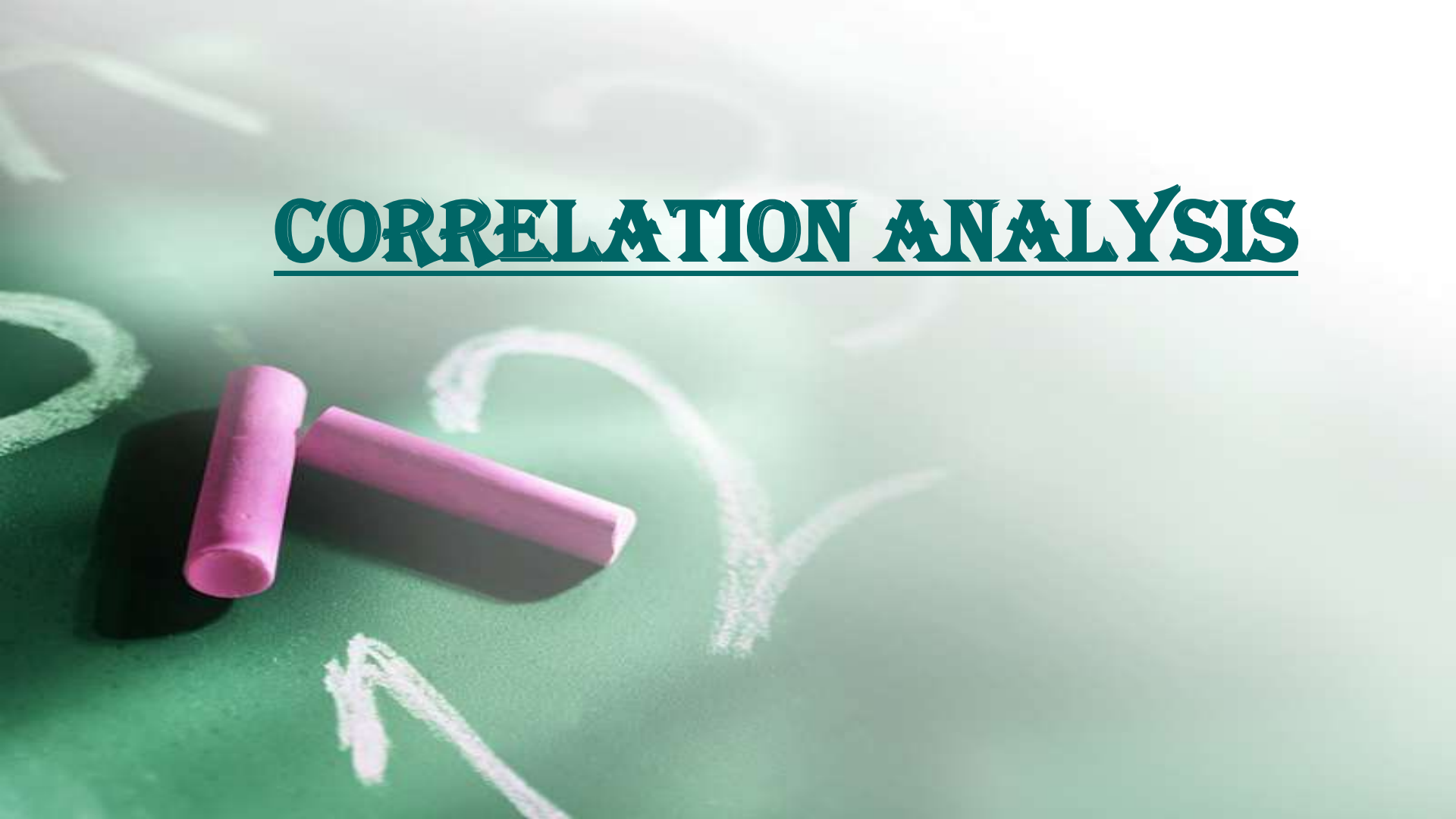
CORRELATION ANALYSIS



CORRELATION

- Statistical tool that helps to measure and analyze the degree of relationship between two variables.
- Example:-*In economics, demand and price are positively correlated.

  * A person’s Income and Expenses
- Correlation analysis deals with the association between two or more variables

TYPES OF CORRELATION

CORRELATION

POSITIVE CORRELATION

NEGATIVE CORRELATION

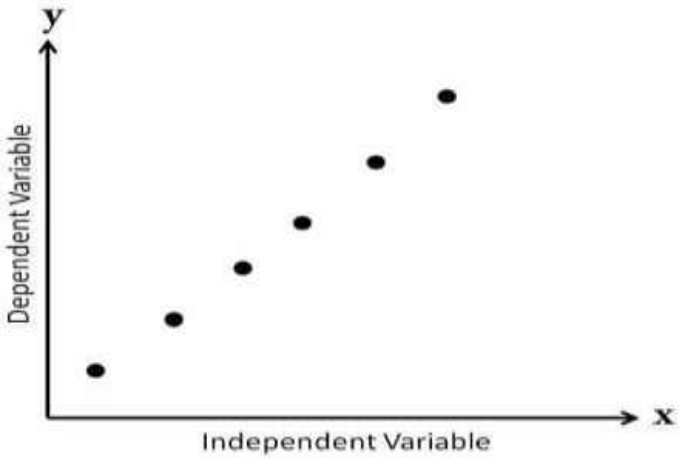
POSITIVE CORRELATION

- Also known as Direct correlation
- If the two variables moves in the same direction, the correlation is said to be positive.
- Ie. With an increase in one variable, the other variable also increases or with a fall in one variable the other variable also decreases.
- Example:- the marks obtained by a student I exam depends on the time spends is positively correlated

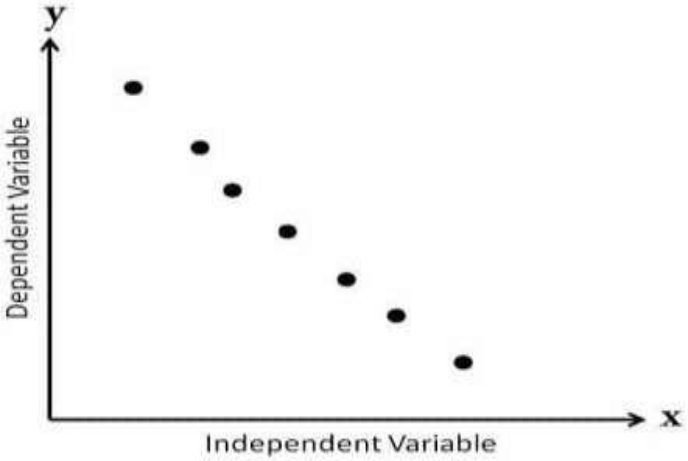
NEGATIVE CORRELATION

- If the two variables moves in opposite direction, then the correlation is said to be negative.
- Ie. With the increase in one variable, the other variable falls , and vice versa.
- Example:- Price and Demand

- Positive Correlation



negative correlation



CORRELATION COEFFICIENT(r)

- Measure of the strength of the linear relationship between two variables.
- Ranges from $-1 \leq r \geq +1$
- The correlation analysis enables us to have an idea about the degree and direction of the relationship between the two variables under the study.

METHODS FOR MEASURING CORRELATION

1) SCATTER DIAGRAM METHOD

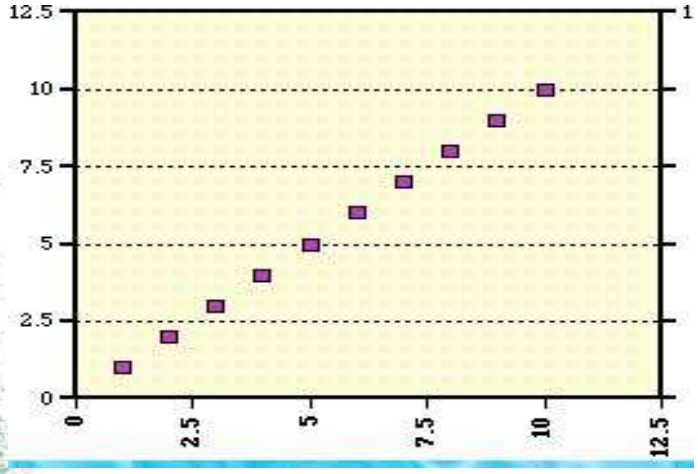
2) GRAPHIC METHOD

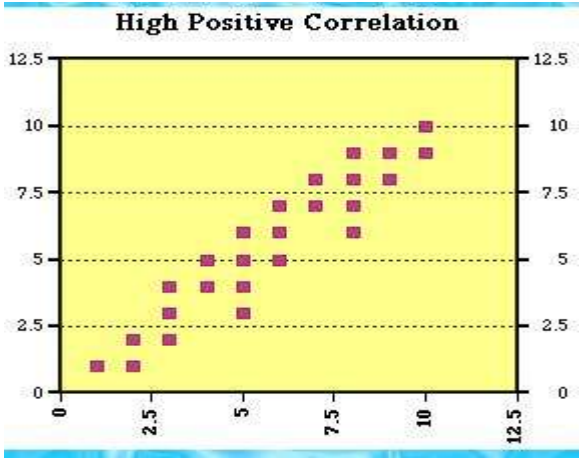
3) KARL PEARSON’S COEFFICIENT CORRELATION METHOD

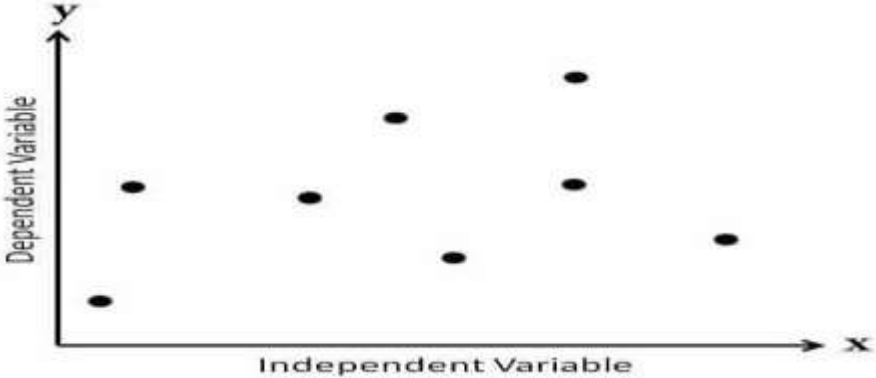
4) SPEAR MAN’S RANK CORRELATION

SCATTER DIAGRAM METHOD

- Also known as *Dot gram or Scatter gram method.*
- Graphical method of studying correlation between two variables.
- One variable is shown on the X axis and the other variable on the Y axis
- Each pair of value is plotted on the graph by means of dot mark.
- On plotting all the items, we get as many dots on the graph as the number of pairs
- The dot so plotted on the graph give an indication of the extent of correlation.


12.5
10
7.5
5
2.5
0
1
0
2.5
5
7.5
10
12.5


High Positive Correlation
12.5
10
7.5
5
2.5
0
0
2.5
5
7.5
10
12.5


y
Dependent Variable
x
Independent Variable

GRAPHIC METHOD

- The values of the two variables are pointed on the graph paper, then we obtain two curve.
- Ie. For one for X variable and one for Y variable.
- By examining the direction and closeness of the two curves so drawn, we can infer whether or not the variables are correlated

KARL PEARSON'S COEFFICIENT CORRELATION METHOD

- Developed by British statistician , Prof. Karl Pearson in 1890.
- C C is the numerical value which shows the degree of relationship between two variables and represented by "r".
- -1<r>+1
- When r=+1, perfect positive correlation
- r= -1, perfect negative correlation
- r>0 but <1 imperfect positive correlation
- r<0 but >-1 imperfect negative correlation

FORMULA FOR DEFINING COEFFICIENT OF CORRELATION.

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

SPEAR MAN'S RANK CORRELATION METHOD

- Introduced by C.Spearman in 1904
- Method of measuring the correlation between two variables.
- Instead of taking values of variables, he considered the ranks of the observation and calculated Sperman's Rank Correlation Coefficient.
- The correlation so obtained Is called rank correlation coefficient.
- Represented by the symbol ρ.
- Qualitative characteristics can be calculated

FORMULA

- $\rho = 1 - \frac{6\sum d_i^2}{n(n^2-1)}$

ARITHMETIC MEAN

ARITHMETIC MEAN

- Arithmetic Mean is one of the measures of central tendency
- It is a mathematical average
- It is a method of representing the whole data by one figure
- It is simple measure and most widely used.
- AM is defined as the sum of the observations divided by the number of observations.
- AM is of two kinds

1. simple
2. weighted

- Simple arithmetic mean is the mean of items which are given equal importance.
- Weighted arithmetic mean is the mean of items which are given different weights in accordance with their relative importance.
- Simple AM is calculated using following way:
- If X1 X2 X3,…..Xn are “n” individual values then the arithmetic mean of the items is

$$\frac{X1+X2+X3+\ldots\ldots+Xn}{n}$$

1) AM IN INDIVIDUAL SERIES

- AM in an Individual series can be calculated using following methods.

a) Direct method

b) Shortcut method

(a) DIRECT METHOD

1. Consider the given values as the value of the variable
2. Add all the values and call them sum "∑X"
3. Count the number of values. Let the number of values be "n".
4. Divide ∑X by "n". This is the arithmetic mean and is denoted by X .

$$\bar{X} = \frac{\sum X}{n}$$

(b) SHORT CUT METHOD

1. Take any value from the series and call it assumed average "a".
2. Subtract this assumed average from all the given values. These differences are denoted by d. d=x-a.
3. Find the sum of all these differences and call it ∑d.
4. Ten divide ∑d by "n" and add it to "a", we get the actual mean of the series.

therefore formula of AM is "$a + \frac{\sum d}{n}$

2) AM IN DISCRETE SERIES

a) DIRECT METHOD
b) SHORT CUT METHOD
c) STEP DEVIATION METHOD

(a) DIRECT METHOD:-

- Let X1 X2 X3……..Xn be “n” observations with corresponding frequencies f1 f2 f3……..fn respectively.
- Let f1+ f2+ f3+ ……..+fn = N
- The Arithmetic Mean (X) = $\frac{X1f1+X2f2+\ldots\ldots\ldots+Xnfn}{f1+f2+f3+\ldots\ldots\ldots+fn}$

$$\bar{X} = \frac{\sum fx}{N}$$

THANK YOU