



CORRELATION – KARL PEARSON'S COEFFICIENT OF CORRELATION- INTERPRETATION OF CORRELATION COEFFICIENT

MEANING OF CORRELATION

- The method of correlation is developed by **Francis Galton** in 1885.
- It is the relationship between two sets of scores or variables.
- Whenever two variables of the same group are so related that the increase or decrease are correspond to the increase or decrease to another or conversely , increase or decrease corresponds to the decrease or increase to another ,they are said to be correlated.

TYPES OF CORRELATION

On the basis of direction of the relation between variables, there are three types of correlation. That are ,

1. Positive Correlation
2. Negative Correlation
3. Zero Correlation

POSITIVE CORRELATION

If when the first variable increases or decreases the other also increases or decreases respectively their relationship is said to be Positive correlation , because they move in the same direction.

Eg. Intelligence and Achievement

NEGATIVE CORRELATION

If when the first variable increases or decreases , the other respectively decreases or increases their relationship is said to be Negative correlation , because they move in the opposite direction.

Eg. Anxiety and Performance

ZERO CORRELATION

If there exists no relationship between two sets of measures or variables.

Eg. Intelligence and Height.

COEFFICIENT OF CORRELATION

- The ratio indicating the degree of relationship between two related variables.
- For a perfect POSITIVE CORRELATION the coefficient of correlation is +1.
- For a perfect NEGATIVE CORRELATION the coefficient of correlation is -1.
- Positive coefficient of correlation varies from 0 to +1.
- Negative coefficient of correlation varies from 0 to -1.

USES OF CORRELATION

- It helps to determine the validity of a test.
- It helps to determine the reliability of a test.
- It can be used to ascertain the degree of the objectivity of a test.
- It can answer the validity of arguments for or against a statement.
- It indicates the nature of the relationship between two variables.
- It predicts the value of one variable given the value of another related variable.
- It helps to ascertain the traits and capacities of pupils.

COMPUTATION OF COEFFICIENT OF CORRELATION

There are two different methods of computing coefficient of correlation .

They are ,

- ✓ RANK DIFFERENCE METHOD
- ✓ PRODUCT MOMENT METHOD

PRODUCT MOMENT METHOD

- Most widely used measure of correlation is the Pearson's Product moment Correlation Coefficient.
- This method is also known as Pearson's product moment method in honour of Karl Pearson , who is said to be the inventor of this method.
- The coefficient of correlation computed by this method is known as the product moment coefficient of correlation or Pearson's correlation coefficient.
- It is represented as ' r ' .

The standard formula used in the computation of Pearson's product moment correlation coefficient is as follows :

$$r = \frac{N \sum(XY) - \sum X \sum Y}{\sqrt{[N \sum X^2 - (\sum X)^2][N \sum Y^2 - (\sum Y)^2]}}$$

Where,

- N - the no: of pairs of data
- Σ - the summation of the items indicated
- ΣX - the sum of all X scores
- ΣX^2 - each X score should be squared and then those squares summed{the sum of the X squared scores}
- $(\Sigma X)^2$ - X scores should be summed and the total squared(the squares of the sum of all the X scores)

- ΣY – the sum of all Y scores
- ΣY^2 - each Y score should be squared and then those squares summed
- $(\Sigma Y)^2$ - Y score should be summed and the total squared

CALCULATE THE CORRELATION OF THE
FOLLOWING DATA

SUBJECT	SCORES IN TEST 1	SCORES IN TEST 2
A	5	12
B	3	15
C	2	11
D	8	10
E	6	18

SUBJECT	SCORES IN TEST 1 (X)	SCORES IN TEST 2 (Y)	XY	X ²	Y ²
A	5	12			
B	3	15			
C	2	11			
D	8	10			
E	6	18			
N=	ΣX=	ΣY=	ΣXY=	ΣX ² =	ΣY ² =

SUBJECT	SCORES IN TEST 1 (X)	SCORES IN TEST 2 (Y)	XY	X ²	Y ²
A	5	12	60	25	144
B	3	15	45	9	225
C	2	11	22	4	121
D	8	10	80	64	100
E	6	18	108	36	324
N=5	ΣX=24	ΣY=66	ΣXY=315	ΣX ² =138	ΣY ² =914

$$r = \frac{N \Sigma(XY) - \Sigma X \Sigma Y}{\sqrt{[N \Sigma X^2 - (\Sigma X)^2][N \Sigma Y^2 - (\Sigma Y)^2]}}$$

$$r = \frac{(5 \times 315) - (24 \times 66)}{\sqrt{(5 \times 138 - 24^2)} \sqrt{(5 \times 914 - 66^2)}}$$

$$r = \frac{1575 - 1584}{\sqrt{(690 - 576)(4570 - 4356)}}$$

$$r = \frac{-75}{\sqrt{114 \times 214}}$$

$$r = \frac{-75}{\sqrt{24396}}$$

$$r = \frac{-75}{156.2}$$

$$r = -0.480$$

$$r = -0.480$$

ie, product moment correlation coefficient=
-0.48

HOW TO EVALUATE A CORRELATION

- The values of ' r ' always fall between -1 and +1 and the value does not change if all values of either variable are converted to a different scale.
- For eg. If the weights of the students were given in pounds instead of kilograms , the value of ' r ' would not change.

INTERPRETATION OF CORRELATION COEFFICIENT

CORRELATION VALUE	INTERPRETATION
≤ 0.50	Very low
0.51 to 0.79	Low
0.80 to 0.89	Moderate
≥ 0.90	High (Good)

ADVANTAGES OF PRODUCT MOMENT CORRELATION

- It gives a precise and quantitative figure which can be interpreted meaningfully.
- It helps in establishing the value of the independent variable from the known value of independent variable.

Thank
you

