Correlation

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Correlation : सहसंबंध

Means association or more precisely it is a measure of the extent to which two variables are related.

कोणत्याही दोन किंवा दोन पेक्षा अधिक बाबीत काही संबंध आहे काय ? याचा शोध घेणे म्हणजेच सहसंबंध काढणे होय.

Types of Correlation : प्रकार

1. **Positive correlation -** धनात्मक सहसंबंध

   Is a relationship between two variables in which both variables move in the same direction. Therefore, when one variable increases as the other variable increases, or one variable decreases while the other decreases. An example of positive correlation would be height and weight. Taller people tend to be heavier.

एका चलात वाढ किंवा घट झाल्यास दुसऱ्या चलात वाढ किंवा घट होते , अशा स्वरूपाच्या सहसंबंधास धनात्मक सहसंबंध म्हणतात.

2. **Negative correlation -** ऋणात्मक सहसंबंध

   Is a relationship between two variables in which an increase in one variable is associated with a decrease in the other. An example of negative correlation would be height above sea level and temperature. As you climb the mountain (increase in height) it gets colder (decrease in temperature).

एका चलात वाढ झाल्यास दुसऱ्या चलात घट होते आणि एका चलात घट झाल्यास दुसऱ्या चलात वाढ होते , अशा स्वरूपाच्या सहसंबध ऋणात्मक सहसंबंध म्हणतात.

3. Zero correlation - शून्य सहसंबंध

Exists when there is no relationship between two variables. For example their is no relationship between the amount of tea drunk and level of intelligence.

एका चलात वाढ किंवा घट झाल्यास दुसऱ्या चलात वाढ किंवा घट होईलच असे नाही,अशा स्वरूपाच्या सहसंबंधास शून्य सहसंबंध म्हणतात

Co-efficient of Correlation : सहसंबंध गुणक

"A Co-efficient of correlation is a single number that tells us to what extent two things are related, to what extent variations in the one go with variations in the other"

दोन चलातील सहसंबंध हा एका अंकाने दर्शविला जातो त्या अंकास सहसंबंध गुणांक असे म्हणतात.

Interpretation

Value of Co-efficient of Correlation	Interpretation
+ 0.00 to + 0.20 - -	Negligible अगदी कमी / दुर्लक्षित करण्यासारखा
+ 0.21 to + 0.40 - -	Low अल्प
+ 0.41 to + 0.70 - -	Moderate मध्यम प्रतीचा
+ 0.71 to + 0.90 - -	Substantial उत्तम प्रतीचा
+ 0.91 to + 0.99 - -	High to very High उच्चतम
+ 1.00 -	Perfect पूर्ण

Methods of Calculating Co-efficient of Correlation

1. ***Spearman's co-efficient of correlation from Rank Order or Rank Differences***

स्पिअरमनचा श्रेणीअंतर किंवा क्रमांकांतर सहसंबंध गुणक

2.Pearsons's Product Moment method

पिअरसनची परिघात परीगुणन पद्धत्ती

Calculate Correlation by --Spearman's co-efficient of correlation from Rank Order or Rank Differences

Students	Maths Marks (X)	Science Marks (Y)	Rank in Maths R1	Rank in Science R2	Rank Diff. D= R1-R2	D^2
A	32	30	10	8	+ 2	4
B	71	59	3	3 = 3.5	- 0.5	00.25
C	80	44	2	5	- 3	9.00
D	97	65	1	2	- 1	1.00
E	52	42	7 = 6.5	6	+ 0.5	00.25
F	49	26	9	9	0	0
G	52	32	6 = 6.5	7	- 0.5	00.25
H	56	68	5	1	+ 4	16
I	69	59	4	4 = 3.5	+ 0.5	00.25
J	50	25	8	10	- 2	4.00
N=10					$\sum D = 0$	$\sum D^2 = 35$

$$\varrho = 1 - \frac{6 \sum D^2}{N (N^2 - 1)}$$ $$\varrho = 1 - \frac{6 \times 35}{10 (10^2 - 1)}$$ $$\varrho = 1 - \frac{210}{10 (100 - 1)}$$ $$\varrho = 1 - \frac{210}{10 \times 99}$$ $\varrho = 1 - 0.21$ $\varrho = 0.79$	ϱ = Spearman's rank difference co-efficient of correlation $\sum D^2$ = Sum of all D^2 N = Number of Students ***Interpreatation :*** *The correlation is +ve and substantial* *सहसं. बंध धन असून उत्तम प्रतीचा आहे .*

Calculate Correlation by --Spearman's co-efficient of correlation from Rank Order or Rank Differences

Ex-1

Students	Test X	Test Y
1	25	15
2	18	4
3	27	23
4	20	12
5	18	5
6	27	22
7	24	10
8	24	9
9	24	12
10	12	10

Ex-2

Students	Reading Marks	Writing Marks
1	75	40
2	70	42
3	68	38
4	70	45
5	67	30
6	63	32
7	63	30
8	62	38
9	63	25
10	60	20

Ex-3

Students	Marks in Maths	Marks in English
1	54	47
2	45	50
3	50	44
4	40	35
5	71	42
6	57	55
7	58	36
8	37	71
9	45	47
10	53	42

Calculate co-efficient of correlation by Pearsons Product moment method

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Students	Test 1	Test 2	Deviations from Mean		Square of Deviations		Multiplication of Deviations
	X	Y	x (X-Mx)	y (Y-My)	x^2	y^2	xy
A	8	18	-2	+2	4	4	-4
B	7	15	-3	-1	9	1	+3
C	15	25	+5	+9	25	81	+45
D	13	20	+3	+4	9	16	+12
E	6	15	-4	-1	16	1	+4
F	9	18	-1	+2	1	4	- 2
G	12	16	+2	0	4	0	0
H	8	10	-2	-6	4	36	+12
I	11	15	+1	-1	1	1	-1
J	11	8	+1	-8	1	64	-8
∑=10	∑X= 100	∑ Y = 160			$\sum x^2$ = 74	$\sum y^2$ = 208	∑xy = 61
	Mx =10	My = 16					

$$r = \frac{\sum xy}{\sqrt{\sum x^2 \ \sum y^2}}$$

$$r = \frac{61}{\sqrt{74X\ 208}}$$

$$r = \frac{61}{\sqrt{15392}}$$

$$r = \frac{61}{124}$$

r = 0.49

Correlation is + ve and moderate

Calculate Correlation by --Pearman's Product Moment Method

Ex-1

Students	Test X	Test Y
1	25	15
2	18	4
3	27	23
4	20	12
5	18	5
6	27	22
7	24	10
8	24	9
9	24	12
10	12	10

Ex-2

Students	Reading Marks	Writing Marks
1	75	40
2	70	42
3	68	38
4	70	45
5	67	30
6	63	32
7	63	30
8	62	38
9	63	25
10	60	20

Ex-3

Students	Marks in Maths	Marks in English
1	54	47
2	45	50
3	50	44
4	40	35
5	71	42
6	57	55
7	58	36
8	37	71
9	45	47
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