DPP-10 Maths - IV Unit - 3

Topic - Rank Correlation

Q-1 : Obtain the rank correlation co-efficients of the following data

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

X	R_1	Y	R_2	$D = R_1 - R_2$	D^2
68	4	62	5	-1	1
64	6	58	7	-1	1
75	2.5	68	3.5	-1	1
50	9	45	10	-1	1
64	6	81	1	5	25
80	1	60	6	-5	25
75	2.5	68	3.5	-1	1
40	10	48	9	1	1
55	8	50	8	0	0
64	6	70	2	4	16

$\Sigma D^2 = 72$

$$r = 1 - \frac{6(\Sigma D^2 + F)}{n(n^2-1)} \quad \text{---} \quad (1)$$

$$F = \frac{m_1(m_1^2-1)}{12} + \frac{m_2(m_2^2-1)}{12} + \frac{m_3(m_3^2-1)}{12}$$

$75 \rightarrow 2$, $m_1 = 2$

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$64 \rightarrow 3$, $m_2 = 3$

$68 \rightarrow 2$, $m_3 = 2$

$$F = \frac{2(4-1)}{12} + \frac{3(9-1)}{12} + \frac{2(4-1)}{12}$$

$$F = \frac{6}{12} + \frac{24}{12} + \frac{6}{12}$$

$$F = \frac{1}{2} + \frac{2+1}{2}$$

$$F = 3$$

From (1)

$$r = 1 - \frac{6(72+3)}{10(100-1)}$$

$$r = 1 - \frac{6 \times 75}{10 \times 99}$$

$$r = \frac{6}{11}$$

$$\boxed{r = 0.545}$$

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