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Assignment 6

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

due to this error the values change

$$\begin{aligned}\sum xy &= 508 - 6 \times 14 - 8 \times 6 + 8 \times 12 + 6 \times 8 \\ &= 508 - 84 - 48 + 96 + 48 = 520\end{aligned}$$

$$\sum x^2 = 650 - 6^2 - 8^2 + 8^2 + 6^2 = 650$$

$$\begin{aligned}\sum y^2 &= 460 - 14^2 - 6^2 + 12^2 + 8^2 = 460 - 196 - 36 \\ &\quad + 144 + 64\end{aligned}$$

$$\sum x = 125 - 6 - 8 + 8 + 6 = 125 = 436$$

$$\sum y = 100 - 14 - 6 + 12 + 8 = 100$$

$$n = 25 \times 520 - 100 \times 125$$

$$[25 \times 650 - (125)^2][25 \times 436 - (100)^2]$$

$$= \boxed{0.666} \text{ is the correct correlation coefficient}$$

(2) Spearman rank correlation

$$r_s = 1 - \frac{6 \sum P_i^2}{n(n^2 - 1)} \rightarrow \text{follows } t \text{ distribution with mean } \mu_s$$

$$= 0.5636$$

$$\text{or S.D.} = \sqrt{\frac{1 - r_s^2}{n - 2}}$$

X	Y	r_x	r_y	d
68	62	4	5	-1
64	58	6	7	-2
75	68	2.5	3.5	-1
50	45	9	10	-3
64	81	6	1	3
80	60	1	6	-4
75	68	2.5	3.5	-1
40	48	10	9	-1
55	50	8	8	-2
64	70	6	2	2

(3) Case 1 when Y is dependent Variable

X	Y	XY	X ²	Y ²
65	67	4355	4225	4489
66	68	4488	4356	4624
67	65	4355	4489	4225
67	68	4556	4489	4624
68	72	4896	4624	5184
69	72	4968	4761	5184
70	69	4830	4900	4761
72	71	5112	5184	5041

$$\text{Sum } \sum X = 544$$

$$\sum Y = 552$$

$$\sum XY = 37560$$

$$\sum X^2 = 37628 \quad \sum Y^2 = 38132$$

$$\bar{X} = \frac{544}{8} = 68 \quad \bar{Y} = \frac{1}{n} \sum_{i=1}^n Y_i = \frac{852}{8} = 69$$

$$SS_{xx} = \sum_{i=1}^n X_i^2 - \frac{1}{n} \left(\sum_{i=1}^n X_i \right)^2$$

$$= 37028 - \frac{1}{8} (544)^2 = 36$$

$$SS_{yy} = \sum_{i=1}^n Y_i^2 - \frac{1}{n} \left(\sum_{i=1}^n Y_i \right)^2 = 38132 - 852^2/8$$

$$SS_{xy} = \sum_{i=1}^n X_i Y_i - \frac{1}{n} \left(\sum_{i=1}^n X_i \right) \left(\sum_{i=1}^n Y_i \right)$$

$$= 37560 - \frac{1}{8} \times 544 \times 852 = 24$$

$$C = \bar{Y} - m \bar{X} = 69 - 68 \times 0.667$$

$$= 23.667$$

$$m = \frac{SS_{xy}}{SS_{xx}}$$

$$= \frac{24}{36}$$

$$= 0.667$$

$$Y = 23.6667 + 0.6667 X$$

where x is dependent variable.

$$m = \frac{SS_{xy}}{SS_{xx}} = \frac{24}{44} = 0.5455$$

$$C = \bar{X} - m \bar{Y} = 68 - 0.5455 \times 69 = 30.36$$

$$\hat{X} = 0.5455 X + 30.36$$

$$\text{for } Y = 70$$

$$\hat{X} = 0.5455 \times 70 + 30.36 = 68.545$$