THE LINEAR REGRESSION PROCESS

From Generation to Interpretation

Presented By

Frank Briody
frankbriody@gmail.com

Prospect High School
Mt. Prospect, IL

2022 MMC Conference of Workshops

Photo credit - Vito Palmisano

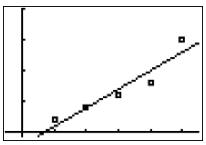
Contents

There is only one large computer program I have used in which there are to a decent approximation 0 bugs: Don Knuth's TeX

– *Jaap Weel*

1 Getting Least Squares Line of Best Fit

1.1 From Calculator



1.2 From Summary Statistics

Formulas (given): $\hat{y} = a + bx \qquad b = r\frac{s_y}{s_x} \qquad a = \bar{y} - b\bar{x}$

Descriptive Statistics: x, y

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
x	5	0	3.000	0.707	1.581	1.000	1.500	3.000	4.500	5.000
y	5	0	7.00	2.24	5.00	2.00	3.00	6.00	11.50	15.00

Correlations: x, y

Pearson correlation of x and y = 0.949
P-Value = 0.014

1.3 From Output

Regression Analysis: y versus x

The regression equation is
y = - 2.00 + 3.00 x

Predictor	Coef	SE Coef	T	P
Constant	-2.000	1.915	-1.04	0.373
x	3.0000	0.5774	5.20	0.014

S = 1.82574 R-Sq = 90.0% R-Sq(adj) = 86.7%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	90.000	90.000	27.00	0.014
Residual Error	3	10.000	3.333		
Total	4	100.000			

1.4 Interpretation

1.4.1 Slope

Slope represents the **predicted** change in response associated with each unit increase in the explanatory variable, **on average**.

1.4.2 Y-Intercept

Y-intercept is the predicted value when the explanatory (x) is 0. [Often the y-intercept is useless.]