Prior Knowledge for Regression
Simple Statistics

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- Click on Prerequisites to Regression

Average, Total Sum of Square, Variance, Standard Deviation

For a given set of *n* numbers $(y_1, y_2, \ldots, y_n)$

Average

$$\bar{y} = \frac{\sum_{i=1}^{n} y_i}{n}$$

Total sum of squares

$$S_t = \sum_{i=1}^{n} (y_i - \bar{y})^2$$

S_t = sum of square of difference between observed and mean value.

Variance

$$\sigma^2 = \frac{\sum_{i=1}^{n} (y_i - \bar{y})^2}{n-1}$$

Standard deviation

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n} (y_i - \bar{y})^2}{n-1}}$$

Example

Given the numbers (5, 8, 50, 3, 7), calculate the average, total sum of the squares, variance, and standard deviation of the numbers.

$$\bar{y} = \frac{\sum_{i=1}^{n} y_i}{n} = \frac{5+8+50+3+7}{5} = 14.6$$

$$S_t = \sum_{i=1}^{n} (y_i - \bar{y})^2 = (5-14.6)^2 + (8-14.6)^2 + (50-14.6)^2 + (3-14.6)^2 + (7-14.6)^2$$

$$= 1581.2$$

$$\sigma^2 = \frac{S_t}{n-1} = \frac{1581.2}{5-1} = 395.3$$

$$\sigma = \sqrt{\sigma^2} = \sqrt{395.3} = 19.88$$

END

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