

ChatGPT Conversation

User: What is the formula for correlation coefficient

ChatGPT: The formula for the Pearson correlation coefficient (r) is:

$$r = (1/n) * \sum[(x_i - \bar{x}) * (y_i - \bar{y})] / (s_x * s_y)$$

User: I am seeing this formula $n * \sum(x * y) - (\sum(x) * \sum(y)) / (\sqrt{(n * \sum(x^2) - (\sum(x))^2)} * \sqrt{(n * \sum(y^2) - (\sum(y))^2)})$

ChatGPT: The formula you mentioned is the 'computational' or 'shortcut' formula for the Pearson correlation coefficient, and it can be expressed as:

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

User: The formula you provided seems a lot simpler

ChatGPT: Yes, the first formula I provided is conceptually simpler because it directly uses the means of the variables, making it easier to understand in terms of how the correlation coefficient is derived.

User: $x_i - \bar{x}$ is probably the variance calculation right?

ChatGPT: The expression $(x_i - \bar{x})$ is not the variance itself, but rather the deviation of each data point x_i from the mean \bar{x} .

User: Can you show the algebraic equivalence between the two equations please

ChatGPT: Certainly! Let's show the algebraic equivalence between the two formulas for the Pearson correlation coefficient.

User: How did this fourth term come $n * \bar{x} * \bar{y}$

ChatGPT: The fourth term $n * \bar{x} * \bar{y}$ comes from expanding the summation $(X_i - \bar{X})(Y_i - \bar{Y})$. When you expand, it becomes $\sum(X_i Y_i) - \sum(\bar{X} Y_i) - \sum(X_i \bar{Y}) + n(\bar{X} \bar{Y})$.

User: Given the population variance formula above, what is the formula for sd

ChatGPT: The formula for the population standard deviation (SD) is simply the square root of the population variance.

User: Is there something wrong with this method for correlation coefficient static double

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corr_Coeff2(double[] x_values, double[] y_values){...}
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ChatGPT: Yes, there are some issues with this method for calculating the Pearson correlation coefficient.

User: Is $\sqrt{a * b}$ equal to $\sqrt{a} * \sqrt{b}$? Is this called commutative?

ChatGPT: Yes, the identity $\sqrt{a * b} = \sqrt{a} * \sqrt{b}$ is correct and is known as the multiplicative property of square roots.

User: Can you help me get this page as pdf

ChatGPT: Certainly! I'll generate the PDF for you.