

## Linear regression/correlation coefficient (AA/AI SL 4.4, )

### Intuition Pump for Understanding Linear Regression and Correlation Coefficient:

1. Everyday Scenario: Think about the relationship between studying time and exam scores. Generally, the more a student studies, the better their score tends to be. This predictable relationship is what linear regression helps to quantify.
2. Visual Representation: Imagine plotting each student's studying hours against their scores on a graph. Each point on the graph represents a student's score and their study hours. Linear regression finds the best straight line (the regression line) that fits through these points.
3. Drawing the Line: The "best fit" line is drawn so that the total distance from all points to the line is minimized. This line can then be used to predict scores based on study hours or to understand the strength of the relationship between the two variables.
4. Correlation Coefficient ( $r$ ):
  - Positive  $r$  (between 0 and 1): As study hours increase, scores increase. The closer  $r$  is to 1, the stronger and more positive the relationship.
  - Negative  $r$  (between 0 and -1): As study hours increase, scores decrease, indicating a negative relationship.
  - Zero or near zero: Little or no apparent relationship between study hours and scores.
5. Practical Example: Use data from previous student scores and study hours, calculate the regression line, and find the correlation coefficient using a calculator or software. This will demonstrate how the line and  $r$  value are computed and what they indicate about the data.
6. Interactive Exercise: Let students collect their own data, perhaps on topics like daily temperature and number of ice creams sold. They can plot this data, perform linear regression, and calculate the correlation coefficient to see how well one variable predicts the other.

This approach helps students visualize and understand the process and purpose of linear regression and correlation, making abstract concepts more tangible and relatable.