P   Chapter 12 Project

Arm Span vs. Height

Is it true that a person's arm span is equal to the person's height? If so, then there should be a perfect linear relationship between arm span and height. Let's find out if this is true by collecting data and creating a linear regression model.

Step 1: Collect data from 10 people. Measure each person's height (in inches) and then the person's arm span (in inches), which is the distance from fingertip to fingertip as the person's arms are outstretched. Record your data in a table similar to the one below. Your results will be more generalizable if you collect data from people of many different ages and heights.

Height										
Arm Span										

Step 2: Create a scatter plot of the data. Use height as the x-variable and arm span as the y-variable.

    a. Does there appear to be a linear relationship between x and y?

    b. Is the relationship positive or negative?

    c. Is the relationship strong or weak?

    d. Does the graph seem to support the claim that a person's height is equal to the person's arm span?

Step 3: Calculate the correlation coefficient, r.

    a. Is the correlation coefficient statistically significant at the 0.05 level of significance?

    b. What about the 0.01 level of significance?

    c. Interpret what it means for the correlation coefficient to be statistically significant for this scenario.

Step 4: Determine the equation of the regression line, $\hat{y} = b_0 + b_1 x$.

    a. Draw the regression line on your scatter plot.

    b. If it is true that a person's arm span is the same as the person's height, what would you expect the slope of the regression line to be?

    c. How close is the actual slope of the regression line to the expected value?

    d. Calculate a 95% confidence interval for the slope of the regression line.

    e. Based on your confidence interval, could you conclude that it is likely that a person's arm span is equal to the person's height?

12

Step 5: Calculate the coefficient of determination, r^2.

   a. Interpret what r^2 means for this scenario.

   b. Does the value of r^2 support the claim that arm span is equal to height?

Step 6: Based on your answers for Steps 1 through 5, formulate a conclusion as to whether a person's arm span is equal to the person's height.