SDSC Science Scholars

Body Measurement Lab Homework

Due: March 1, 1995

Introduction to Correlations

As a scientist or engineer, you will always be looking for patterns in nature. These are called **correlations**. A correlation is defined by The American Heritage Dictionary as:

1. *A causal, complementary, parallel, or reciprocal relationship, especially a structural, functional, or qualitative correspondence between two comparable entities: a correlation between drug abuse and crime.*

2. *Statistics. The simultaneous change in value of two numerically valued variables: the positive correlation between cigarette smoking and the incidence of lung cancer; the negative correlation between age and normal vision.*

So, a **positive correlation** between two things means that if you see more of the first thing, you will likely see more of the second thing. A **negative correlation** means that if you see more of the first thing, you will likely see *less* of the second. A **zero correlation** means that seeing more of the first thing has no effect on whether or not you see more or less of the second thing.

Correlations are measured by computing something called the *correlation coefficient*, usually abbreviated as *r*. The American Heritage Dictionary defines correlation coefficient as:

A measure of the interdependence of two variables that ranges in value from -1 to +1, indicating perfect negative correlation at -1, absence of correlation at zero, and perfect positive correlation at +1.

Gathering the Data

In this experiment, you will look for correlations between human body height and other human features. Chose *at least 10* of your friends and family members to be subjects (the more, the better). Include yourself in the list of subjects. For each subject, record his or her age and gender. Then:

1. Measure his or her height, in inches.

2. Measure his or her wingspan, that is, the distance between the farthest fingertips on outstretched arms.

3. Measure the distance around his or her head at the widest point.

4. Measure the size of his or her hand, from the tip of the outstretched thumb to the tip of the outstretched pinkie.

5. Record all of these in the columns of a spreadsheet. Do not put the names of the units in the spreadsheet with the data, just enter the numbers.

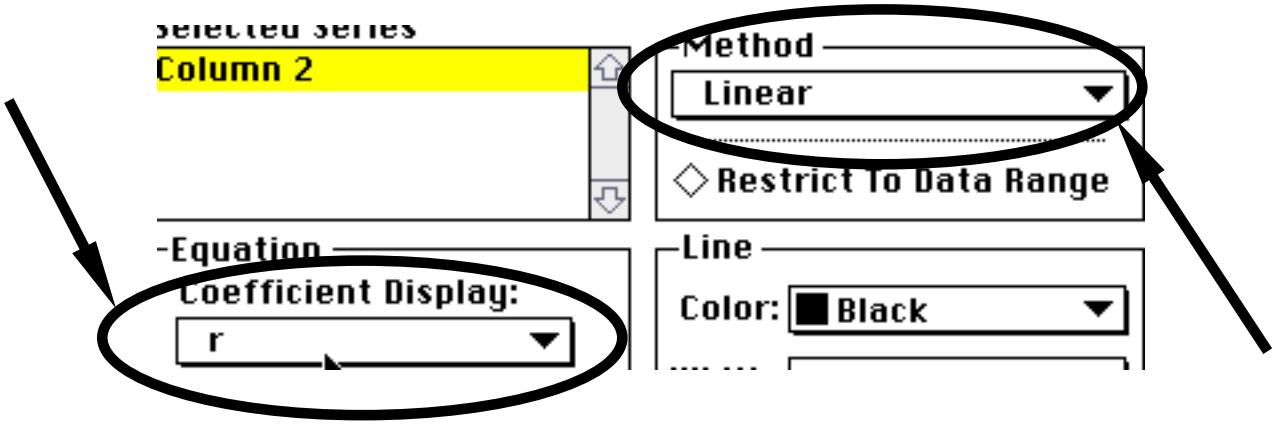
Graphing the Data and Determining the Correlation Coefficients

When you have collected all of the data:

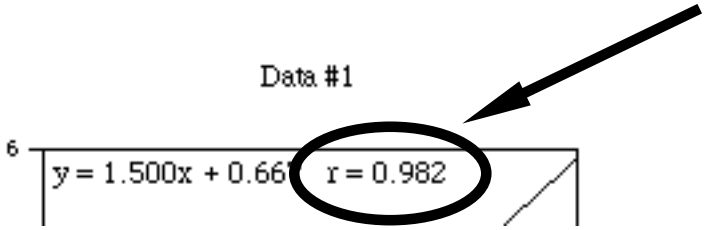
1. Copy and paste the spreadsheet columns into CricketGraph. Only copy and paste numbers, not any text column headings.

2. Do separate scatterplots of wingspan vs. height, head size vs. height, and hand size vs. height. To make a scatterplot, select **Graph** then **New Graph** then **Scatter**. For each scatterplot, place height on the X axis, and the other variable on the Y axis.

3. For each scatterplot, have CricketGraph compute *r*, the correlation coefficient. Do this by selecting **Options** and **Curve Fit**. Select a Method of **Linear** and a Coefficient Display of **r**, as shown below:



CricketGraph will display the fitted line equation and the correlation coefficient at the top of the graph, like:



The closer r is to 1.0, the more correlation there is between the two variables.

Writing the Lab Report

On March 1, turn in a lab report on this experiment. This is to be done on one of the word processors. It needs to include:

1. A statement of what this experiment was trying to achieve.

2. The data tables from your spreadsheet.

3. The scatterplots from CricketGraph.

4. What, if anything, you were able to conclude about body measurement correlations from the results.

Data Collection on the Internet

As part of this experiment, we are also going to collect everyone's data into one big plot. To do this, enter your data using NetScape. In NetScape, select the **Open** button or select **Open Location** from the **File** menu. Then enter the address:

`http://www.sdsc.edu/SDSC/Educ_Outreach/Scholars/height.html`

To enter all of your data, run this page once per subject.