Lab: Creating a Basis for Visualization

GEOG 319/658   **Exercise #5**   **FALL 2014**

Creating a Basis for Visualization

Due: Monday, October 6

A. Program to calculate the radius of a circle

Completing this short program will provide the basis for tackling the longer program in section B below.

Ultimately, let's assume that we wish to create a proportional circle map depicting the population of some of the largest metropolitan areas in the United States for 2010. The following are the population values for the seven largest metropolitan areas:

Chicago-Naperville-Elgin	9,461,105
Dallas-Fort Worth-Arlington	6,426,214
Houston-The Woodlands-Surgar Land	5,920,416
Los Angeles-Long Beach-Anaheim	12,828,837
New York-Newark-Jersey City	19,567,410
Philadelphia-Camden-Wilmington	5,965,343
Washington-Arlington-Alexandria	5,636,232

Write a program using JavaScript that computes the radius of the circle for Philadelphia given that we presume the radius for the largest circle is 1.1 inches. We will use the following formula:

$$r_i = \left(\frac{v_i}{v_L} \right)^{0.57} \times r_L$$

where r_i ▬radius of the circle to be drawn

r_L ▬radius of the largest circle on the map

v_i ▬data value for the circle to be drawn

v_L ▬data value associated with the largest circle

The value .57 is known as the circle exponent and exaggerates the sizes of larger circles because studies have shown that people tend to underestimate the sizes of larger circles. If you wish circles to be scaled in direct relation to the data values, then you would use a circle exponent of .50.

B. Program to calculate the radii of several circles

Write a program using JavaScript that computes the radii of all circles for the above metro areas given that we presume the radius for the largest circle is 1.1 inches. Figure 8.6 of Peterson provides some elements that you can utilize in this program, including the use of arrays and the use of loops. You should make use of two functions in this program (examples of functions can be found at various places in Peterson's chapter 8), one to find the maximum value in an array, and the other to calculate a circle radius for a given data value. The function for finding the maximum value should have two arguments: an array of data values and a variable representing the number of data values. The function for finding the circle radius should have three arguments: the maximum data value, the maximum desired radius, and the data value associated with the circle. The functions should appear in the <head> section of the HTML code. Remaining JavaScript code should appear in the <body> section of the HTML code.

Figure 8.6 from Peterson provides one approach for finding the largest value in a dataset. One limitation of that approach is that it initializes the maximum data value to a particular number, which prevents the method from being applied more generally. A better approach is to base your code on the following algorithm:

Let MaxValue = the first data value
For each remaining data value i
        If the ith data value > MaxValue
            Set MaxValue = ith data value
        End If
End For

Your output should show the name of each metro area with the associated population and radius, with each metro area on a separate line. To produce formatted output for the radii, you could use the toFixed method (see http://www.w3schools.com/jsref/jsref_tofixed.asp). For example, to display a radius to the nearest .01, your code might look something like the following:

var x = 2.4567
x = x.toFixed(2)

x will now have the value 2.46.

You are required to provide thorough documentation for both of the above programs. In addition to documentation throughout the program, include an introductory section that indicates the purpose of the program and the nature of the input data and the output created by the program.

Your program also should exhibit a structure that makes it easy to read the code. As we discussed in class, this will include indentation where appropriate and lining up the various tags in the HTML code.

When you have finished the assignment, post the URLs for each program to this Google worksheet . Hand in a printed copy of all computer code.