Lab 4: Wildfires and Predictions (From Directed to Guided Discovery)

We will be using the Shodor "Fire!" activity to understand what makes a "simple" wildfire "wild". We will use fractions and decimals and percents and averages and measures and share and report to each other in the form of a graph the results of an exploration of fires.

We will first discuss the basics of how fires spread. Write down the two rules.

1. Go to the Fire! Activity. Initial 2-Point Model: http://www.shodor.org/interactivate/activities/fire1

   Initial 2-Point Model:

   - Set the "probability of burning" to 0.
     - Click anywhere in the forest. Watch what happens.
     - What percent of the trees were burned?
     - How many iterations (steps) did your fire burn?
     - "Regrow" the forest and start a new fire in a new starting place.
     - Does the same thing happen? Why or why not?
     - Repeat this several times. See if you can detect a pattern.
     - How does the number of iterations (steps) change with fire starting point?

   - Set the "probability of burning" to 1.
     - Click anywhere in the forest. Watch what happens.
     - What percent of the trees were burned?
     - How many iterations (steps) did your fire burn?
     - "Regrow" the forest and start a new fire in a new starting place.
     - Does the same thing happen? Why or why not?
     - Repeat this several times. See if you can detect a pattern.
     - How does the number of iterations (steps) change with fire starting point?

- What would you expect the simplest model would be consistent with the Two Fire Observations? Observe the class model graph.

For the remaining explorations, record your results in:

http://tinyurl.com/COSC150SharedFire

2. Successive Approximation 1: We will add a middle point. Set the "probability of burning" in the Fire! App to 0.5 or 3/6 or 1/2 (hit enter). Before we burn the forest, what would you expect to get if the Two-Point Model is correct?

    - As a CONTROL, always start the fire at the CENTER tree. Watch what happens.
    - What percent of the trees were burned?
    - How many iterations (steps) did your fire burn?
    - Regrow the forest and start a new fire. Does the same thing happen? Why or why not? ***Repeat this three times and enter each value in the shared sheet***. See if you can detect a pattern.

3. Now repeat the burning simulation 20 times with the probability set to 0.5, (ALWAYS REGROWING and STARTING WITH THE CENTER TREE) and record your individual burn results in the shared google sheet IN YOUR OWN TAB. (Use the template as a suggestion on how to organize your data collection)

    Then calculate the following (and record on the CONTROL CENTER tab):

    - What is your AVERAGE percentage of trees burned?
    - What is your AVERAGE number of iterations (steps) the fire burned?

    - What is the VARIANCE in the percentage of trees burned?
    - What is the VARIANCE in the number of iterations (steps) the fire burned?

    - What is the STANDARD DEVIATION in the AVERAGE PERCENTAGE of the trees burned?

- What is the STANDARD ERROR in the AVERAGE PERCENTAGE of the trees burned?

- How does the class Model graph change?

- Could we have used any individual results to represent the class?

4. Successive Approximation 2: We will proceed to add ***several interpolation*** points. But we will share the workload!

   Now repeat the burning simulation 20 times with YOUR probability set to YOUR CUSTOM VALUE (=YOUR INDEX/15), (ALWAYS REGROWING and STARTING WITH THE CENTER TREE) and record your individual burn results in the shared google sheet (be sure to share YOUR PROBABILITY) IN YOUR OWN TAB. Then calculate (and record on the CONTROL CENTER tab):

   - What is your AVERAGE percentage of trees burned?
   - What is your AVERAGE number of iterations (steps) the fire burned?

   - What is the VARIANCE in the percentage of trees burned?

   - What is the STANDARD DEVIATION in the AVERAGE PERCENTAGE of the trees burned?

   - What is the STANDARD ERROR in the AVERAGE PERCENTAGE of the trees burned?

   - How does the class model graph change?

5. If there is time, we can repeat with a new control starting all fires from a corner instead of the center. Is there any difference compared to the CONTROL CORNER?