Patrick Coleman
Period 6

COMPUTER SYSTEMS RESEARCH
Fall/Spring 2007-2008
Code and Testing Writeup Quarter 1

Running Description of Code:

At the end of first quarter, the program displayed the environment, and had the agents move and harvest sugar. Now, the program begins with a small number of agents and adds to the population using a logarithmic function so that it reaches carrying capacity. Modifications in the individual agents include an improved move method, a random age limit, and a variable for red or blue color. The GUI window has been modified to include buttons to change the graph and change the refresh rate. There is an input box to change the refresh rate in the display of the environment and of the graphs. the two graphs which are now displayed are the population growth over time, and the percent of total wealth over the percent of the population (Lorenz curve). To get the population graph, I keep track of the length of the array of agents at each time step in the simulation file and cycle through the array of population values in the display file. To get the wealth graph, i cycle through the array of agents and store the wealth of each individual agent. Then I sort this array and cycle through it keeping a running total to determine percents.

Description of Testing:

First quarter, I tested whether or not my code conformed to the Sugarscape described by Axtell and Epstein in Growing Artificial Societies. I continued this testing in the second quarter when I added new features like the improved move method for agents and the age limit. I tried different code to determine which corresponded best to the results published by Axtell and Epstein. However, this quarter I spent more time testing the graphs which I constructed. I tested various methods of adding agents to the environment to reach carrying capacity before settling for a logarithmic function. I compared the shape of my graph to the shape of the logarithmic graph, which is a commonly used estimate for population growth in real life. The shape did not match perfectly when I incorporated agent death, but changes in the rules for agent death and population growth gave me more fitting results. For the wealth graph, I began with a bar graph similar to the graphs used by Axtell and Epstein when studying the Sugarscape. After using a bar graph similar to theirs which has different heights to represent frequency, I decided it would be better to augment the width of the individual bars. My matched the pattern shown by the graphs in Growing Artificial Societies. Then I decided to test a different representation of wealth distribution, using the Lorenz curve and the Gini coefficient. There are various different ways to compute the Gini coefficient, and by making slight changes in the code I was able to minimize calculations while obtaining accurate results. I did this by representing the area of the entire graph as 1 and doing 1-2*(area under the Lorenz curve) = gini. The value showed inequality similar to that shown by the bar graphs.