

TJHSST Computer Systems Lab Senior
Research Project Proposal
Exploring Artificial Societies Through
Sugarscape
2007-2008

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Abstract

Agent based modeling is a programming application that computer scientists are using to approach real world problems. One application of modeling involves sugarscape societies, artificial societies that simulate some of the behaviors of real world societies, such as gathering food, trading, and fighting one another. Although agent based modeling does not add to fundamental understandings, it is a way to understand complexities of artificial societies that would be difficult to quantify otherwise. Throughout the course of the year, I hope that my sugarscape society can be increasingly more complex in its behavior and reveal more about human societies through quantifiable tests.

Keywords: agent based modeling, artificial societies, sugarscape

1 Introduction - Elaboration on the problem statement, purpose, and project scope

1.1 Scope of Study

Right now, the sugarscape contains individuals that know their metabolism and vision. I hope to work toward individuals that can reproduce, form

social networks, trade with one another, cope with disease, and fight when necessary. Specifically, I'm interested in the concept of social networks and how they develop in a society.

Another particular of the problem is that of language. Now, the program I've developed is written in Netlogo. However, MASON probably provides more flexibility. At some point, I'd like to begin coding in MASON, using the same parameters as in Netlogo.

1.2 Expected results

I hope to come away with a better understanding of sugarscape societies, if nothing else. For instance, how do birth rate and death rate effect the population, and in turn, how do these rates effect food source? Under what conditions will individuals form social networks, and what might motivate an individual to join a new social network?

I'm interested in sugarscape because, if it is possible, I'm interested in the application of this kind of research to real life problems. If we are capable of the kinds of research and technological advances that we are, why can't we solve problems such as poverty and poor health? I'm interested in the practical application of computer science to tackle social issues.

1.3 Type of research

This project would be considered pure applied research. The intent of this application of agent based modeling is to better understand how artificial societies function with certain parameters, and hopefully apply this understanding to real life problems.

2 Background and review of current literature and research

There are numerous projects that have been constructed in the realm of sugarscape, and others dealing with societal behaviors.

An Agent-Based Model of Ethnic Mobilisation by Armano Srbljinovic, Drazen Penzar, Petra Rodik and Kruno Kardov (2003) explores the political and social upheaval in Yugoslavia and other Eastern European countries. They developed a model with agents possessing ethnic membership, a degree

of ethnic mobilization, a degree of grievance, and a social network. Appeals, which represent the influence of political figures on a population, could be out to members of both ethnicities. They discovered that social mobilization depends largely on initial conditions of identity importance and social networking, rather than the strength and type of appeals, though those do play a role in mobilization.

Groups, Social Influences and Inequality: A Memberships Theory Perspective on Poverty Traps (2003) by Steven N., Durlauf explores the effects of social networks on poverty. Durlauf explores the effect of horizontal and vertical influences, family education and investment in education, violence, crime, and personal incentive on the success of an individual in a community. His research suggests that poverty is affected largely by the community one lives in, and escaping that poverty is not easily remedied.

3 Procedures and Methodology

At the moment, I am programming in Netlogo, though I may begin working in MASON. At the moment, the next step in my project, after I clear up some glitches concerning the tendency to move toward the southwest corner of the sugarscape and a problem of overlapping, I want to work toward social networks. This would involve establishing connections between adjacent individuals.

Netlogo has a good graphic display of the workings of the sugarscape. However, I hope to use some statistical analyses to quantify the visuals that Netlogo provides, including the Gini Coefficient. I can also compare my sugarscape to existing models to test for efficiency and accuracy.

4 Expected Results

The visuals are the most telling part of the sugarscapes the demonstrate much of the societys behaviors. IN addition to that, I hope to use the Gini Coefficient and other statistical analyses to quantify the results. There are a number of ways to add on to a sugarscape, in both the programming aspect and the application aspect. It is possible to try to program it in a language outside of Netlogo or Java, in the case of MASON. It is also feasible to apply any number of complexities to the sugarscape, such as education, pollution,

disease, and appeals from other groups to migrate.