Math 312 Project Write–ups Spring 2017
Agent Based Modeling Projects

Normally there are 4 sections and an appendix to a complete writeup. For this project you will only do the first 2 sections and the appendix. This project or a very similar one using genetic algorithms. The length is not prescribed and the size of the appendix can vary greatly dependent on the project. The two sections of the paper are typically 3-6 pages.
TIP: You may want to write the appendix before the second section. The appendix can be full of equations and symbols. The second section should be mostly words that describe in terms of the real setting what the equations in the appendix implement.

Section 1) Statement and Overview
This introductory section should include a description of the problem and what factors you believe to be important. A brief discussion of the affects of changes at the individual level on specific aggregate (population wide) behavior should appear as well.

Grading criteria:

1. Is a clear distinction made between aggregate (population wide) descriptions, individual behaviors and interactions of these individuals? Are all three levels of description included appropriately.

2. Is there a clear description of the relationships between variables and/or parameters that you could examine with this model.

3. Is there sufficient description of the model using words to establish an intuition or understanding of how the model relates to the real world system you are modeling. Someone with very little math background should be able to understand the issues you are discussing.

Section 2) Model Description
Give a fairly specific overview of your model. What are the important agent variables? In sentences (and with at most a few equations) describe how they evolve. You should refer to the appendix for details of formulas.

Grading criteria:

1. Is there a clear statement of agent behavior on an individual level?

2. Is there a clear statement of the interactions between variables? (If agents only interact through a common price determined by total demand and supply, then say so.)

3. Is the timing (order) of the operations of the algorithm clear?

4. Is there a clear statement of what aggregate (population wide) features you will examine and how they are calculated?

Section 3) Results and 4) Model Critique
Not required for this project.

Appendix: Model Specification
Write a concise, mathematical or algorithmic description of your model. Start by listing the agent variables followed by the parameters and rules for determining the values of the variables at each time step. Describe (in words) the time stepping process including which rules update which variables first if such an order is important. Finally, describe what aggregate (population wide) variables you measure and how they are calculated.
In general, if equations can describe the rules simply, you should use equations. If a few words can replace a large algebraic expression, that is also appropriate (for example, $x(t+1) =$ the value of x that maximizes F). Introducing intermediate variables for complicated expressions that are repeated can ease understanding of the model specification as well.

Grading criteria:

1. Is the model specification complete? Is there a rule for updating each variable? Are all parameters identified?

2. Does the model agree with that described in the text? Are there major features of the model that aren't explained in the text or factors described in the text that can't be addressed in the model?

3. Are rules and interactions described at the individual level in the style of microsimulation? This means that the aggregate variables should generally not evolve directly, but rather the agent variables evolve in time and the aggregate variables are calculated from them.