CAP6675: Agent-Based Modeling: Netlogo and MASON

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1 Objective

The objective is gain some familiarity with an agent-based modeling environment, either NetLogo or MASON by creating a "hello world" type model.

2 Preliminaries

You will need to download and install either NetLogo or MASON from the following web sites [1, 2] and their user manuals with tutorials can be found in [3, 4]. The "hello world" complex system you will implement on this assignment is fully described at [5].

3 Part 1: Implement the following model

Using either NetLogo or MASON to build the *Collectivities Model*. This model consist of a number of identical agents moving on a 2D space. An agent can "sense" the number of other agents inside its *local-radius* to determine if it is "feeling" crowded or lonely. Agents can "see" all other agents inside their *visible-radius* and move at a given *speed*. All agents have two behavioral rules:

Condition	Action
The agent is lonely	Move towards the crowd
The agent is crowded	Move away from the crow

If the number of agents inside their *local-radius* is less than a given *threshold* then the agent moves away from the crowd by moving away from the agent inside its *visible-radius* with most agents surrounding it, "the crowd". Otherwise, it moves towards the crowd.

A more detailed description of this models and a step-by-step tutorial using NetLogo is attached.

4 Part 2: Simulate, explore and answer the following questions

1. What is the emergent behavior of the system? Does this beahvior appears to model any real world behavior of collectives? Which ones? Why do you think the model resembles a real world collective? What do you think are the modeling desicions that led to this?

2. Try changing the parameters of the model: *local-radius*, *visible-radius*, *speed*, and *threshold*. Do all these parameters affect the emergence of collective behavior? which do and which do not? Are there any correlations among the parameters or they are independent?

3. Is this model a CAS? why or why not?

4. If you think is not a CAS, give two ways to improve the model to make it a CAS

5. State your observations and conclusions about this model.

6. **extra credit** Improve your model to account for either evolution or adaptation.

5 Deliverables

- Write up: answer to questions, include screen captures if needed
- Code you wrote in either Netlogo or MASON (java)

6 Grading

Part 1: 50 points. Part 2: 50 points. Bonus question, 10 extra points.

References

[1] **NetLogo**, http://ccl.northwestern.edu/netlogo/

[2] **MASON**, http://cs.gmu.edu/eclab/projects/mason/

[3] **NetLogo 4.1.3 User Manual**, http://ccl.northwestern.edu/netlogo/docs/NetLogo%20User%20Manual.pdf

[4] Sean Luke, **Multiagent Simulation and the MASON Library**, http://cs.gmu.edu/sean/temp/mason.pdf

[5] Nigel Gilbert **Agents-Based Models**, SAGE Publications, 2008.