

Agent-Based Modelling and Simulation with NetLogo

Day 2: Session 4

Building a model of segregation

Session 4

- Introducing the segregation model.
- Setting up the basics: setup, run, step
- Creating the agents.
- Adding parameters and adjusting the model.
- Model testing and discussion.

Introducing the segregation model

- Social segregation phenomena refer to the separation of social actors into different social interaction groups.
- (Schelling, 1969) Schelling devised a simple spatially distributed model of the composition of neighbourhoods, in which agents prefer that at least some fraction of their neighbours be of their own “colour”.
- He found that even quite colour-blind preferences produced quite segregated neighbourhoods.

Creating a model of segregation

1. Start with a population of agents with different colours.
2. Use the NetLogo 2-dimensional grid as our abstraction for space.
3. Model agent neighborhood preferences as a tolerance threshold.
4. Create an agent behaviour in which each agent:
 1. observes the neighbourhood.
 2. calculates the ratio of agents with different colours.
 3. moves to a different location if it does not like the current neighbourhood.

Step 1: setting up the initial population

- Create a setup button.
- Create the setup procedure.
- Create a slider for the population size.
- Create a population of agents with two different colours.

Step 2: tolerance

- Add a neighbourhood tolerance parameter.
- Create a slide to model this tolerance as a global parameter for all the agents.
- Create a reporter to return the ratio of neighbours with different colour.
- **Note:** this reporter should be called by the agents (**called in a agent context**) as such each agent measures this ration relatively to its own colour.

Step 3: relocation

- Check if an agent is happy with the current location.
- Relocates the agent to an unoccupied patch if the agent is not happy.

Step 4: check for model stability

- The simulation may eventually stop if all the agents are happy with their current locations.
- Create a reporter to determine if all the agents are happy.
- Stop the simulation if this is the case.

Model observation and discussion

Model Improvements

- Add a slider to control the population colour ratio.
- Add a parameter to determine the neighbourhood size considered by each agent.
- Modify the model to consider heterogeneous tolerances by specifying two types of agents:
 - Agents with high tolerance values.
 - Agents with low tolerance values.