

Model Description Sheet

Starting Code

The code for this model was mostly built from scratch. I learned from GAMA tutorials and used the “Conditional Structures” syntax models found in the GAMA library to learn about finite state machines which is how my agents functioned to make decisions about “developing” a certain cell. The “[Grid Species](#)” tutorial on the GAMA step by step guide gave me the basic syntax to have my grid respond to the moving agents on top of it.

Model Description

The base model is Burgess’ Urban Development Model – which assigns concentric zones of different class groups around an urban center – identifying that locational decisions of urban actors are a balance between mobility and desire for space. This industrial era view assumed that wealthy actors would want to get as far away from the dirty city center as possible and that low-income actors would lack the mobility to do so and remain in the center. These rules are simplified into two parameters – different desires for density made by different income groups and different zones of possible movement around a city center experienced by different income groups. The model works in 5 stages:

1. Environment: a grid environment with a static city center. Both are adjustable in size.
2. Seeding: The environment is seeded randomly with agents identified as either “high” “medium” or “low income.” The number of agents is adjustable by the user.
3. Decision: Using a finite state machine mechanism the agent can make two different decisions: Develop, which means it finds its current position suitable. An agent finds its current position suitable if the number of agents nearby it is less than the parameter set by the user. OR Flight, which means it does not find its current position suitable and moves.
4. Adjustment: Each cycle agents go toward the city center based on the mobility level set by the user. The mobility level adjusts the radius of an invisible circle around the city center within which the agent is capable of moving. This was originally meant to be the radius into which agents were initially randomly seeded, but instead the model performed this action in a slow “magnetic” like manner which was unexpected.
5. Grid Update: Based on the locations of each agent at the end of this cycle the grid updates its colors to reflect the agents which overlap it.

Findings

The main interesting finding I made from experimenting with my model’s variables that was if mobility assumptions held true, a concentric distribution of classes formed. But if I changed mobility levels of just one group it had unexpected consequences on the development decisions of the other groups. For example, if the low-income mobility level increased, the subsequent “sprawl” of low-income development permitted some middle- and high-income development near the city center – forming a more heterogeneous city. Significant development of high income near the center was incapable of occurring without increasing low income mobility. If I speculate wildly this may say something about public-funded transit having less than egalitarian motives – as it allows central urban spaces to be re-occupied by wealthy interests by opening-up cheap and accessible land on urban peripheries.