Draft Version – ODD protocol of SOME replication model

1. Purpose

Question: What is the purpose of the model?

Answer: This model aims to examine the effects of introducing heterogeneity of categorization and variability to the simulated urban sprawl pattern, and it provides an opportunity to discover the importance of each factor on the residential pattern through sensitivity analysis of model results.

Explanation: Every model has to start from a clear question, problem, or hypothesis. Therefore, ODD starts with a concise summary of the overall objective(s) for which the model was developed. Do not describe anything about how the model works here, only what it is to be used for. We encourage authors to use this paragraph independently of any presentation of the purpose in the introduction of their article, since the ODD protocol should be complete and understandable by itself and not only in connection with the whole publication (as it is also the case for figures, tables and their legends). If one of the purposes of a model is to expand from basic principles to richer representation of real-world scenarios, this should be stated explicitly.

2. Entities, state variables, and scales

Questions: What kinds of entities are in the model? By what state variables, or attributes, are these entities characterized? What are the temporal and spatial resolutions and extents of the model?

Answer:

Agents: In this model, agents represent the residents in the model environment. Each agent tends to select their location based on their preference and environment. For each agent, it has six different attributes, including rnum, cluster, alphaq, alphas, alphac, and utility. Rnum is the random number of one agent to decide which class the agent belongs to, and cluster is the actual class of this agent. Moreover, alphaq, alphas, alphac are the preference weights of the agent to select their location. Among them, alphaq is about the aesthetic quality of one agent, alphas relates to the distance of their location to the service center in an urban area, while alphac shows agents' social comfort in the neighborhood of their location. Additionally, utility denotes the utility value calculated by the function of their selected location. Each agent will select their location among 15 randomly chosen cells, evaluate them based on their utility function, in which different preference weights are introduced, and they will finally select the one which has the highest utility value as the residential location.

Spatial Unit: In this model, we use a 151*151 grid to build our model world, each cell represents a possible residential location. Each patch has four attributes: quality, sddist, comfort, ltype. Quality represents the aesthetic quality of a location, which is distributed by a generator, which time when the user run the model, the quality value is static and imported from the generated file. Sddist is the standard distance of this cell from the service center, while comfort denotes the social comfort value of the location, it is calculated when each agent wants to select the locations from these cells. Ltype is a Boolean variable which describes whether an agent selects the location.

Environment: In this model, we have some service centers in the model environment, which is an important factor for agents to select their location. Initially there is one service center, and every time when 100 agents select their location, there will be a new service center generated in the model.