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Spatial Autocorrelation and Models of Residential Segregation

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In May 1969, Thomas Schelling posited, in a RAND memorandum, that housing segregation could emerge from the random aggregation of residential preferences and tipping thresholds of intolerance, even if the neighbors prefer integration. As he noted in that memorandum, exogenous factors such as institutional housing restrictions and constraints from income upon mobility play a primary role whereas his hypothesis should be given tertiary consideration in the country's pursuit of social equity. Schelling's model of segregation is considered one of the early agent-based models and in 2005 he received the Nobel Prize in Economics for his insights that advanced the field of game theory.

The purpose of our analysis was to understand the influence of the lived experience of geographic 'space' upon patterns of residential segregation, particularly in the instance of ethnic and racial clusters. We developed a specialized C++ program, by adapting Luc Anselin's Local Indicator of Spatial Analysis, to generate spatial autocorrelation data for 22 U.S. cities. To account for the modifiable areal unit problem of different block level population sizes, we incorporated the weighted variance developed by Renato Assunção and Edna Reis for Empirical Bayes Smoothing. With respect to the blocks that were clustered in 1990 at a 1% and 5% significance level, we explored if there was a statistically significant change in their clustering by 2000. The preliminary findings were that the increase in the concentration of a racial or ethnic group in a cluster of blocks does not always occur by Schelling Random Processes.

The next stage of the analysis is to improve the fidelity of a simulation of residential segregation by conditioning the subsequent concentrations in a block, of an ethnic or racial group, upon various initial levels of that ethnic or racial group in the surrounding contiguous blocks. From the use of R and SaTScan, it may be possible to show that we have improved the predictive robustness of current agent-based models of residential segregation.