ANALYZING NEIGHBORHOOD PATTERNS WITH A CELLULAR AUTOMATA MODEL WHEN SIMULATING SEGREGATION

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Segregation, the separation of people or groups based on various factors, can depend on a range of social, economic, historical, and political factors.

There are several models of segregation that have been proposed by social scientists and researchers. Schelling's model was proposed by the economist Thomas Schelling. The model assumes that individuals prefer to live among people who are similar to them in terms of race, ethnicity, or religion. Using a simple simulation, Schelling demonstrated that even a small preference for homogeneity can lead to a high degree of segregation. Other, the spatial competition model, assumes that people choose neighborhoods based on a combination of their preferences and the available housing options. The network model assumes that individuals form social networks based on their relationships with others. These models are just a few examples of the many models of segregation that have been proposed over the years. Each model makes different assumptions about the underlying mechanisms that lead to segregation, and each has its own strengths and weaknesses.

The cellular automata segregation model is a computational model that was first proposed by Thomas Schelling to explore the dynamics of residential segregation. The model uses a simple grid-based representation of a neighborhood, where each grid cell is occupied by an agent with a binary attribute.

The key insight of the model is that even when agents have only a weak preference for neighbors of the same type, a high degree of segregation can emerge over time. In the model, agents move to empty cells if they are dissatisfied with their current neighborhood composition. Dissatisfaction is measured as the fraction of neighbors of the opposite type, and agents move to cells where the fraction is below a certain threshold.

The model has been extensively studied and has been used to explore a wide range of phenomena related to segregation and spatial patterns. Even with a small preference for similarity, segregation can emerge rapidly and persistently. Segregation can occur even when agents have a preference for diverse neighborhoods, as long as they also have a stronger preference for similarity. The degree of segregation can depend on the size of the neighborhood, the number of agents, and the thresholds for moving.

The cellular automata segregation model has been used to study a variety of social phenomena, including segregation by race, ethnicity, and income. It has also been used in urban planning and design to explore the impact of different policies on segregation and diversity.

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