Geosimulation: Object-Based Modeling of Urban Phenomena

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Geosimulation – A New Approach to Urban Modeling

Geosimulation represents a new wave of urban spatial simulation modeling that has come to the fore in very recent years. Besides traditional urban modeling, the intellectual roots of geosimulation derive from developments in computer science and the geographical sciences. The geosimulation approach draws together modern urban and social theory with the theory of adaptive systems, artificial life, and complexity theory regarding cities, offering a unique perspective that traditional simulation has commonly lacked: a view of urban phenomena and the spatial processes that shape them as a result of the *collective dynamics* of multiple urban animate and inanimate objects. Geosimulation can be considered as an extension of traditional urban modeling in several ways.

The first aspect regards the depiction of *spatial units*. While traditional urban models have focused on aggregate partitions of urban space—essentially *modifiable* regional units—geosimulation works with discrete and *spatially non-modifiable* objects, such as houses, lots, householders, and landowners.

The second feature relates to the portrayal of *spatial interactions*. Traditionally, urban geographic models have focused on describing flows of matter and information between aggregate spatial units. Geosimulation models contrast by concentrating on the interactive behavior of elementary geographic objects. If interactions are modeled at higher-level units of urban space, they are simulated in geosimulation as the outcomes of collective interactions at *micro*-scales.

The third characteristic is concerned with the treatment of *time*. While traditional

urban models are inherently continuous and, thus, indifferent regarding the choice of time units, geosimulation models, in contrast, tend to be based on discrete and intuitively justified units of time.

Finally, traditional and geosimulation models differ in there *attitude* to urban simulation. Geosimulation could be regarded as a reconsideration of the goals of simulation, with a new emphasis on building scenario-generating games—tools to think with—rather than predictive models. Various simulation scenarios can be designed, each based on different suggestions regarding factors of urban dynamics. In this way, geosimulation can offer several different viewpoints on the dynamics that shape urban phenomena.

Proposed topics for contribution

The purpose of this special issue of the journal, *Computers, Environment and Urban Systems*, is to draw together a substantive body of work defining the state-of-the-art in geosimulation of urban systems. Abstracts and full papers are currently welcomed for consideration. Papers will be submitted to a process of peer review, with a quick turnaround for an anticipated publication date in mid 2002. Proposed topics for papers are listed below, although submissions outside of these guidelines are also welcomed.

- New techniques for geosimulation: advances in cellular automata and multi-agent modeling of urban dynamics; integrated geosimulation approaches
- Operationalizing geosimulation models: making connections between high-resolution spatial and non-spatial phenomena, tuning and validation of geosimulation models
- New development environments for geosimulation
- Foundations of geosimulation: discretization of space and time in geosimulation models; behavior and agency
- Geosimulation and its implications for our understanding of real-world urban dynamics

Timetable for submissions

Now	Call for proposals
July 25, 2001	Abstracts due
November 14, 2001	Final papers due
January 2002	Notification of acceptance
Summer 2002	Publication of special issue

For more details

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