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Urban Growth Prediction: A Review of Computational Models and Human Perceptions

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ABSTRACT

Human population continues to aggregate in urban centers. This inevitably increases the urban footprint with significant consequences for biodiversity, climate, and environmental resources. Urban growth prediction models have been extensively studied with the overarching goal to assist in sustainable management of urban centers. Despite the extensive body of research, these models are not frequently included in the decision making process. This review aims on bringing this gap by analyzing results from a survey investigating developer and user perceptions from the modeling and planning communities, respectively. An overview of existing models, including advantages and limitations, is also provided. A total of 156 manuscripts is identified. Analysis of aggregated statistics indicates that cellular automata are the prevailing modeling technique, present in the majority of published works. There is also a strong preference for local or regional studies, a choice possibly related to data availability. The survey found a strong recognition of the models' potential in decision making, but also limited agreement that these models actually reach that potential in practice. Collaboration between planning and modeling communities is deemed essential for transitioning models into practice. Data availability is considered a stronger restraining factor by respondents with limited algorithmic experience, which may indicate that model input data are becoming more specialized, thus significantly limiting wide-spread applicability. This review assesses developer and user perceptions and critically discusses existing urban growth prediction models, acting as a reference for future model development. Specific guidelines are provided to facilitate transition of this relatively mature science into decision making activities

KEYWORDS

Urban Models; Urbanization Prediction; Survey; GIS Modeling; Urban Planning

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