Introduction

- Urbanization is one of the most complex and dynamic processes of landscape changes.
- Driving factors contributing to urban land changes (ULCs) are different spatiotemporally.
- Recently, modeling ULCs with GIS and remote sensing has become a central component in urban geographical studies.
Land Use Change Modeling

- Describes the changes of land use and land cover over time.

- Can be used to predict different scenarios of land use changes.

- Uses currently available data or condition to combine with attributes (including population, economic, politics) and dynamic factors (including distance to water, distance to CBD, distance to road, etc.) to predict the future scenarios.
ULC models enumeration......

http://www.wisegeek.com/what-is-a-simulation-model.htm
Continued

http://blog.sina.com.cn/s/blog_6352e4c40100pswc.html
Features of land use modeling

- Level of analysis
- Cross-scale dynamic
- Driving factors
- Spatial interaction and neighborhood effects
- Temporal dynamics
- Level of interaction
Factors selected for ULC modeling

- Population
- GDP
- DEM
- Social factors
- Environmental factors
Dynamic Factor Selection

Distance to...

Types of ULC models

Cellular Automation (CA) Model

A cellular automaton (CA) is a collection of cells arranged in a grid, such that each cell changes state as a function of time according to a defined set of rules that include the states of neighboring cells.

The CLUE model is a dynamic, spatially explicit, land use and land cover change model.

Agent-Based Model (ABM)

An agent-based model is a computational model for simulating the actions and interactions of autonomous agents with a view to assessing their effects on the system.

http://jasss.soc.surrey.ac.uk/14/3/7.html
Markov Model

A technique for predictive change modeling.

Predictions of future changes are based on the current condition.

http://www.slideshare.net/suj1thjay/markov-model-for-tmr-system-with-repair
Land use scenarios dynamics model (LUSD Model)

The basic idea of LUSD is from SD model and CA model, both of which have statistical and spatial signification.

Continued

City expansion model in metropolitan area (CEM) model:

The CA model and Tietenberg model are composed to CEM model. It is an effective model to investigate the relationship between the urban expansion and population growth.

http://kungpao.tv/cem-vs-crm-which-platform-is-better/
## Model Selection

<table>
<thead>
<tr>
<th>Model</th>
<th>Advantages</th>
<th>Disadvantages</th>
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</thead>
<tbody>
<tr>
<td>CA Model</td>
<td>Statistical and spatial signification</td>
<td>Difficult to guarantee space resolution</td>
</tr>
<tr>
<td>CLUE Model (the conversation of land)</td>
<td>Simulate multiple LULC change simultaneously</td>
<td>Invalid in the case without historical condition</td>
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<tr>
<td>MARKOV Model</td>
<td>Simulate the condition of T2 time point based on that of T1</td>
<td>No spatial signification</td>
</tr>
<tr>
<td>LUSD Model (land use scenarios dynamics model)</td>
<td>Combine CA model and SD model Can do the factor analysis</td>
<td>Invalid for climate and resources factor analysis</td>
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Conclusions

Projecting future states of land use and land cover is the precondition in numerical predictions about global changes. The current state of the ULC models is very useful for geographers, and using model to do LULC has good prospects for development.
Reference


