Hands on Urban Modelling

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Abstract

This presentation is concerned with theoretical foundations and experiments on urban land use dynamics modelling applied to two case study towns, *Bauru* and *Piracicaba*, located in the west of São Paulo State, Southeast of Brazil. This is a pioneer approach, in the sense that the land use change simulations are conducted by means of a cellular automata (CA) model, where the technical and social infrastructure of the towns have been adopted as driving forces of urban land use change.

This work is committed with building up a methodological guideline for CA modelling of urban land use change through statistical methods like the "weights of evidence" and "logistic regression". Such models are useful for providing understanding on land use change trends as well as forecasts of urban land use change patterns, what enables local planning authorities to manage and reorganize city growth, according to the concerned sites vulnerability status and environmental capacity.

Basically, the "weights of evidence" method is based on the "Bayes theorem of conditional probability", which concerns the favorability to detect a certain event, which can be in the current case a certain category of land use change (e.g. non-urban use to residential use), provided that an evidence (e.g. availability of road acess; proximity to clusters of commercial activities, etc.), also called explaining variable, has already happened. Such faborability is expressed in terms of probability of a cell belonging to the study area to have its original land use altered throughout time. Likewise this method, the logistic regression also assesses the cells probabilities for changing their initial land use, upon basis of weighting the different contributions of the explaining variables on a given land use transition, which is regarded as the dependent or outcome variable.

It is worth reminding that the statistical methods employed for these modelling experiments are not constrained by the straitjacket of rigid theories devices. Since they consist in a wholly empirical approach, their applicability can be extended to further Brazilian and worldwide cities, provided that the minimum necessary sets of explaining variables maps are available.

The presented modelling analyses embody the logic of urban development undertaken by agents (or social actors) like real state entrepreneurs and public authorities, shedding light upon their behaviour. They thus help the scientific community as well as the civil society as a whole to better understand processes of urban development and change, both on local and global scales, and hence, to positively intervene on them.