

A NN Knowledge Based Model On Land Use Dynamics

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Biography

Professor of “Mathematical Models in Planning” and “Urban and territorial Systems Analysis” at the Faculty of Architecture, Polytechnic of Milan.

The main research domain concerns urban sustainability, which is focused by spatial mapping on complex interactions among urban attributes, on the relationships between energy and urban form and on dynamics models of urban sprawl.

Abstract

In the last few years the development of new methodological and technological tools in the field of Geocomputation has greatly improved the ability to extract organized knowledge from empirical Data.

Neural Networks have shown to represent an extremely powerful tool in investigating the urban complexity and the dynamic interactions among different agents and urban attributes.

More recently NN have been implemented to forecast urbanisation dynamics, by processing the time series of different land uses.

Nevertheless this approach, to be effective, needs long time series Data, which are rarely available.

With limited Data Bases, in the experience of the authors, the NN processing results are quite unstable and strongly dependent on the architecture of the NN.

On the contrary SOM (Self Organised Map) is a NN able to classify the records in a sound and stable configuration, easy to analyse and interpret.

The aim of the paper is to build a dynamic model which integrates the classification capabilities of the NN SOM with a dynamic probabilistic land use model, which is able to reproduce the microscale diffusion pattern of urbanisation.

This study assumes a Cellular Automata Information System at some temporal thresholds. Through the Neural Network SOM it is possible to process the information through times of each cell, in order to classify the cells in groups with similar dynamic behaviour.

From each group a cell sticking process is activated on the base of transition probabilities which are based on the codebooks which characterize each group.

References

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