

AGENT-BASED URBAN SIMULATION: RELATIONSHIP BETWEEN DECISION-MAKING OF RENT AND SPACE-TIME LAND USE PATTERN

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BIOGRAPHY

Research Associate of Department of Architecture and Civil Engineering, Faculty of Engineering Kobe University (1997-2003), Research Associate of Department of Architecture and Architectural Engineering, Kyoto University Faculty of Engineering (2003-). Research Interests are multi-agent simulation of urban phenomena, architectural design based on mathematical programming and evolutionary computing, image search algorithms for architectural photographs, and spatial data mining.

INTRODUCTION

The von Thünen model of agricultural land use (von Thünen, 1826) was succeeded to Alonso's residential land use model (Alonso, 1964). They are still important in urban economics. According to these models, urban land use would form a concentric circle pattern. The urban activity which can pay more land bid locates more near CBD. However, actual land use patterns don't show such clear pattern. Activities locate at various points in time and have various periods of existence. Moreover land owners have speculative expectation of capital gain/loss of their lots. Such condition would bring about uncertainty on decision-making of both land demander and supplier.

The purpose of this study is to examine the relationship between decision-making of the rent and the land use pattern by agent-based urban simulation.

CURRENT DEVELOPMENTS

One dimensional urban space is supposed in order to visualize space-time urban development. Business, factory, and residential agents are defined as land-demand agents. A land owner is defined as a land-supply agent. Each lot is evaluated by following two utility functions: one is the distance from CBD, the other is environmental condition. A land-supply agent decides the rent of its lot for earning more money. A decision tree is employed for modeling the decision-making. A land-demand agent searches the most preferable lot within the limited budget. In order to increase demands of both agents, the decision tree is optimized by Genetic Programming.

Until now, the result that the land use formed irregular pattern has been obtained. By the deadline of the paper submission, I will proceed with this study by improving the model and demonstrating some scenarios.

REFERENCES

Alonso, W. (1964). *Location and Land Use*. Cambridge: Harvard University Press.

von Thünen, J.H. (1826). *Der Isolierte Staat in Beziehung auf Landschaft und Nationalökonomie*, Hamburg.