

Agent Based Model to Simulate Urban Land Use Change

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ABSTRACT:

The economic reform and open door policy had a profound impact on Iran's urbanization. Because human-environment interactions are so complex, Agent Based Models (ABM) provides a powerful new set of tools to scholars with diverse background. ABM strength lies in their ability of combining spatial modeling techniques with biophysical and socioeconomic models. In this study, two Landsat TM images of Fars Province, in southern of Iran, which experienced dramatic land use change acquired in 1995 and 2005, were classified by the maximum likelihood method in the IMAGINE ENVI software. This paper presents an ABM, which is designed to simulate land use change based on human behavior. CORMAS software, which is a programming environment dedicated to creating ABM. In this paper, we construct a spatially explicit ABM of land use change through specification of interdependencies and feedbacks between agents and their environment. We have derived the method of ABM to consider: (1) First aim is to understand what kind of spatial patterns emerge from different agent characteristics, and decision and learning mechanisms. Landscapes produced by the learning ABM is compared to actual land use data. (2) By varying the parameter estimation schemes and the spatial metrics calculated from the simulated land use and the actual land use, the role of agent preferences for different land uses is explored. We find that ABM are particularly well suited for representing complex spatial interactions under heterogeneous conditions and for modeling decentralized, autonomous decision making. Based on decisions of spatially distributed individual economic agents operating in a policy framework, the model produces aggregated land use patterns as an outcome.