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EXPERT-INFORMED URBAN GROWTH SIMULATION USING MCE -AHP AND CELLULAR AUTOMATA: A CASE STUDY OF TEHRAN METROPOLITAN AREA

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Abstract

Urban spatial growth has been a central challenge in urban and regional management in recent decades, leading to many problems such as destroying natural spaces and agricultural lands, creating thermal islands, etc. To deal with such complications, researchers have provided different methods to simulate urban spatial growth. Cellular Automata (CA) model is one of such solutions and take advantage of various methods, such as logistic regression, artificial neural networks, etc. to calculate the transition rules. The main objective of this study was to compare two common methods applied in this area, namely logistic regression method and multi-criteria evaluation (MCE) method. To this end, one of the densest urban areas in Iran, i.e., the urban complex of Tehran, was selected as the study area. Next, urban spatial growth in 2017-2019 in the chosen area was simulated using a combination of CA model and the mentioned methods. Finally, the outputs of the models were examined using validation methods, and the existing land use/cover map for 2019. The results obtained for validation methods such as Cohen's kappa, quantity disagreement and allocation disagreement, ROC curve, as well as the spatial agreement method indicate that the MCE-AHP method outperformed the logistic regression method. This can be attributed to the fact that the MCE-AHP method does not depend on the past trends and consider future conditions in terms of the upcoming policies and plans.

Key words: Cellular Automata, logistic regression, multi-criteria evaluation (MCE), Urban spatial growth.

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