Comparison of Artificial Neural Network and Cellular Automata-Markov in the locative development prediction of Lahidjan county using on Remote Sensing and Image Processing

Masoud Ranjbar Shoulami*,Mohammad reza Yamaghani,

Abstract Lahidjan county is one of the most important and also vulnerable areas in the Guilan province and increasing urban population in this county has caused expansion of urban areas in three last decades. If this trend continues, destruction of natural resources and the structure of natural ecosystems would be expected. Therefore this research was performed, aiming to Comparison of Artificial Neural Network and Cellular Automata-Markov in the locative development prediction of Lahidjan county using on Remote Sensing and Image Processing, with using computer techniques in urban growth modeling and comparing two managed and unmanaged modeling, the direction for sustainable management of urban growth in this county be created. Accordingly, monitoring and prediction of future changes in land use (LU), and monitoring of landscape changes with synoptic analysis, in this county was conducted. Change detection was conducted applying three TM Landsat satellite images at 1991, 2000 and 2010. To predict the LU changes up to 2030, Cellular Automata- Markov (CA_Markov) and Artificial Neural Network (ANN) models has applied based on validation of this models in the study area. Each of these models were implemented under two basic (historical) and Protection scenarios and in all, four modeling was conducted. In order to modeling the Protection scenario, criteria was used to predict suitable places for expansion of urban areas. Also for implementing synoptic analysis in 1991, 2000, 2010 and 2030, some composition and configuration-based metrics were calculated at class level and their changes is detected. The results indicated that urban areas increased and the area of the

agricultural regions is reduced in over the past years. Validation of CA_Markov and ANN models revealed that these models despite some weaknesses, have had an acceptable performance in prediction of the LU changes in the study area. The results of the CA_Markov and ANN models indicated this fact that if the changes of land use based on historical and Protection scenarios up to 2030, continued, urban area respectively, about 37% and 43% will increase compared to the current situation. The result of the synoptic analysis indicated that in the predictions based on the basic scenario with two models, the landscape has been more fragmented, more complex and irregular in shape and more diversified in the term of land use and types, moreover, the results revealed that sprawl of the urban areas have caused increase in fragmentation, complexity and irregularity of agriculture patches and decrease in total area of agriculture class. Versus, the result of the synoptic analysis in predictions based on Protection scenario than the basic scenario with two models indicated the landscape has been less fragmented and more organized in shape and expanding urban areas, cause less fragmentation, complexity and irregularity of the patches in the region.

Keywords : Key Words: Cellular Automata- Markov, Artificial Neural Network, Urban Growth, Lahidjan County