Modeling Urban Land Use / Cover Changes Based on Machine Learning Techniques: A Case study of Shanghai, China

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Urban growth is one of the most important topics in urban studies. A city is considered as a complex system. It consists of numerous interactive sub-systems and is affected by various factors including governmental land policies, population growth, transportation infrastructure and market behavior. To understand the driving forces of the urban form and structural changes, the satellite-based estimation is considered as the appropriate methods to monitor these dynamic changes in a long term.
Based on previous studies, classified Landsat satellite images are used to monitor the temporal changes of land use and land cover (LULC) for the study area. Furthermore, modeling and simulation are believed to be powerful tools to explore the mechanisms of urban evolution and to support the planning in growth management. In this study, authors use the social and geographical factors to model and simulate the urban growth in Shanghai. Finally, an attempt is made to utilize two machine learning models (the deep convolutional network and multi-layer perceptron neural network) to predict the future changes in the land use / cover, and compare the performance of two models.

Keywords: LULC, Machine learning, Shanghai, Urban growth modeling