Addressing the effect of image classification techniques and its impact on modelling the causative factors of urban densification

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Abstract :

The proportion of world's population living in the cities has grown exponentially in the last 5 decades and it is expected to reach over 9.3 billion by 2050. The rising number of urban dwellers is due to the increase in the spatial extent of cities and metropolitan areas. Urban densification is a mechanism for intensifying the physical form and realizing compact cities rather than sprawling urban areas. Spatial patterns of urban structure is frequently concomitant with densification. In order to understand the relation, it is relevant to study different causative factors, which can be categorized into physical, economic, environmental, accessibility and policies and governance. The primary aim of this study is to examine the comparison between natural Jenks and geometric classification technique on the basis of nature and distribution of data for both urban expansion and densification. A non-ordered Multinomial regression model (MLR) is used to assess the probability of built-up development. The model is built, calibrated and validated for the area of Brussels Capital region and Brabant's of Belgium. Three 100x100m built-up maps are created for 2000, 2010 and 2020 from Belgian cadastral. A list of 18 causative factors selected by comparing and analyzing through 43 peer-reviewed articles. The causative factors are calibrated using MLR and validated using ROC curve and goodness of fit. The study points out that geometric classification yields better results when the nature of the data is skewed (positively or negatively). The study lays a foundation for better insights to the kind of data and various factors, which controls the urban dynamics and thus help the policy makers, researchers and stakeholders in exercising and executing a sustainable system.