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The Integration of Heterogeneous Open Source Software to Develop an Urban Simulation Model

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Recent development of open source geospatial software offers newopportunities for the spatial analysis and urban modeling fields. The use of open source software enables analysts and modelers to build dedicated and advanced modelsthrough computer programing.However, many open source geospatialsoftware usually provides building blocks forthe static data management, analysis, and visualisation. Hence, development of dynamic simulation model with open source geospatial software is not yet fully fledged.

The goals of this study are twofold. Firstly, it aims to develop a dynamic urban growth simulation model by using and integrating heterogeneous open source software. Secondly, by doing so, it aims to suggest a new way to use logistic regression model as a method for dynamic urban growth simulation.

The researchusesR and Processing to develop an urban growth simulation model. The former is a well-known open source statistical software, and the latter is an open source software for data visualisation. The integration of two open source software and the model development are carried outin a Java programming environment.

The reason of such integration is to build a dynamic urban growth simulation from a conventional binominal logistic regression model. Binominal logistic regression is well-known method to calculate a certain choice probability, and it has often been used to analyse the possibilityof future urban development. However, the result from such logistic regression by nature isstochastic and static. To make it as a method for urban growth simulation, what this research has done is the integration of following tasks: execution of logistic regression, extraction of coefficients from the result, calculation of development probability, iterative allocation of new development, and visualisation of such urban development.

The model was applied to a case study area, Busan Metropolitan Area, Korea in order to examine its usability.It has produced statistically meaningful outcome, and the model shows a new way of developingdynamic urban simulation model. However, all data processing and manipulation is done in a separateGIS environment, and it is not integrated into the model. A tight-coupling withopen source geospatial softwarecould be a possible future resarch.