
3D City Models Based Spatial Analysis to Urban Design

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Abstract

Urban design is a subject that is concerned with the shape, the surface and its physical arrangement of all kinds of urban elements. Although urban design is a practice process and needs much detailed and multi-dimensional description, the urban designers could only analyse urban space with script and imagination in the past, and only the urban design guideline and some drawing picture were carried out in the traditional design schema. How to improve the quality of urban space effectively and how to express the design schema perfectly are the problems troubling the urban designers for a long time. The 3D city models based spatial analysis gives the possibility of solving these problems. Compared with the traditional applications of 2D GIS in urban planning, the 3D city models based spatial analysis would be more meaningful for the urban designers. The computable analysis models could be constructed under the urban design guideline. Through the integration of analytical models and realistic visualization models, the 3D spatial analysis that is impossible to the 2D GIS can be carried out.

Instead of being described with some adjective words, the designing schema and rules can be presented and analyzed in 3D virtual environment. The change of the urban fabric and the building density could be analyzed through the structure analysis. The noise environment, sunshine condition, heat environment, ventilation condition, and pollution condition could be analyzed through the physical quality analysis. The control of the height, the color and the style of the buildings, and the evaluations of the surrounding environment of the squares and the streets are also available based on the visual impact analysis. The analysis of the distribution of different function parts and its proper place are possible through function analysis of urban space.

Based on the 3D city models, urban designers can express the design concept clearly. With the analysis functions, it is also possible to control and improve the quality of urban space effectually. There would be a great progress when we design the urban space with an operational 3D analytical system, like Cyber City GIS.
