

TOWARDS SEMANTIC 3D CITY MODELING AND VISUAL EXPLORATIONS

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ABSTRACT:

In recent years, the integration of semantics into 3D city models has become a consensus. The CityGML standard laid the foundation for the storage and application of semantics, which boosts the progress of semantic 3D city modeling. This paper reports an extended semantic model based on CityGML and its visual applications under the content of a three-dimensional GIS project of China. Firstly, concepts Room, Corridor and Stair are derived from concept Space which represents the similar concept of Room in CityGML. These concepts will benefit the application of indoor navigation. Geological model is also supported by this model, which enables the underground analysis. Secondly, a semi-automatic data integration tool is developed. The types of semantic concept are defined based on the Technical Specification for Three Dimensional City Modeling of China which leads to an adaptive way to assign semantics into pure geometry. In order to better visualize the models enriched by semantics, two fundamental techniques, data reduction and selective representation are then introduced. It shows that semantics could not only help improve the performance of exploration tasks but also enhance the efficiency of spatial cognition. Finally, two exploration cases are presented, one is indoor navigation, the semantic model is used to extract the geometric path and a semantics enhanced navigation routine is used, which greatly enriches the connotation of ordinary navigation applications; the other is a unified profiler, in order to fill up the cross-section correctly, semantics are incorporated, which help ensure the topological and semantic consistency.

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