Study on Modeling and Representation of Indoor Maps

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Abstract. With the continuous construction of urban and the rapid development of the commercial economy, more large buildings (such as shopping malls, airports, transportation exchange centers, stadiums, exhibition centers) are built, and people stayed longer in the indoor space. Furthermore, the interior structure and layout of large buildings became increasingly complex, the demand for indoor maps was also increasingly prominent. In this case, how to represent rich indoor information more clearly to fit people's cognition demand becomes one of the hot researches on indoor maps.

The current researches on indoor maps primarily focuses on indoor location-based services, such as positioning and navigation, but little attention was paid on modeling and representation of indoor maps. However, the indoor maps are the foundation of information and computation for indoor location services, and their modeling and representation will affect the transmission of map information seriously, which is vital for human cognition. None of the current indoor maps give apparent method to model and represent indoor map/elements. Most of them, from the view of architecture design, focus on the representation of architectural elements. However, these indoor maps convey very limit information about indoor cartographic features. Even worse, they would mislead people to take the areal place as completely closed or open one, which can't provide correct indoor navigation to move inside or outside of these places.

In this paper, we, from the perspective of spatial cognition, based on the cognitive demands on spatial location, spatial positioning and spatial navigation, divide the indoor space into three types: closed, semi-closed or open spaces according to the different types of space boundaries, and pay particular attention on the case of half-height space. Accordingly, we choose re-

sponding objects to model and represent these spaces, which would carter to human's cognition to easily understand and interpret the indoor map. Furthermore, this method can enrich the indoor information and meet the navigation and application needs of indoor maps.

Keywords. Indoor maps, Spatial cognition, Open space, Half-height space, Modeling and Representation