Indoor navigation has to deal with more issues as compared to outdoor navigation. Those issues include but are not limited to; need more level of detail to process enclosing area around navigating subject or object, consideration of the context of navigation (about locomotion type and its operating environment), and dealing with unconstrained indoor space for accurate results. Because of these complex issues, most of the frameworks for indoor navigation support for only one single type of locomotion, i.e. either walking, driving, or flying. And this decision to select a specific type of locomotion results in restricting the use of representation of indoor space for other types of locomotion e.g. graph-based abstraction of indoor space for driving cannot be used for flying. In this work, we addressed the problem of supporting different types of locomotion in indoor space by determining 3D navigable subspace for the given locomotion type based on its physical constraints. While determining 3D subspace, we focused on some issues that include indoor space representation, precision of subspace computation, and "the consideration of the context of navigation" (about indoor space and the locomotion type). To achieve better representation of indoor space, the subspaces are determined based on the connected opening spaces. And for precise subspace computation according to the given locomotion type, we used the geometric methods i.e. configuration
space from robotics field. Furthermore, a semantically enriched 3D indoor virtual model in CityGML format and different locomotion types (flying, driving, and walking) containing information (semantics, geometry, and topology) were considered to examine the context of navigation. Last but not least, the subspacing procedure was presented and implemented in a sound mathematical framework i.e. Multilayered Space-Event Model (MLSEM) as proposed by Becker, Nagel, and Kolbe in 2008 and 2009.

Stichworte:
IndoorGML; Indoor Navigation; GISPro_IndoorNavLoco; GISTop_IndoorNav; LOCent; LOCTop_Spatial_modeling_and_algorithms

Kongress-/Buchtitel:
Proceedings of the 8th 3D GeoInfo Conference

Jahr:
2013

Monat:
Nov

Revied:
ja

Sprache:
en

WWW:

TUM Einrichtung:
Lehrstuhl für Geoinformatik

Occurences:
- Einrichtungen > Fakultäten > Fakultät für Luftfahrt, Raumfahrt und Geodäsie > Lehrstühle und Professuren > Geoinformatik (Prof.Kolbe) > 2013
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