3D pgRouting and visualization in Cesium JS using the integrated model of LADM and IndoorGML

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SUMMARY

Currently, the indoor environments are enormous and complex, affecting the users of the buildings during the navigation from one space to another. Therefore, many indoor applications have been developed to guide them during their time inside the building. Each indoor navigation application is based on a different approach or technology to provide the best routing experience for the indoor environment users. However, most of these applications do not consider the users' rights, restrictions, and responsibilities, and as a result they are providing the same routing options for all users. In reality, each user has a different relationship with the indoor environment. By not considering these differences, the indoor navigation application cannot provide the best route for the users based on their type. Therefore, the integrated model of Land administration domain model (LADM) and IndoorGML aims to define the users' rights, restrictions, and responsibilities during the indoor navigation to provide an optimal route. This paper proposes developing a web-based application for 3D indoor navigation for an educational building based on the integrated model of ISO 19152 LADM and OGC IndoorGML. Using International standards aims to enable the presented solution to work for any building in the world. The integrated model of LADM and IndoorGML will provide different routes for the users based on the user's access rights such as student, visitor, maintenance, and teacher. A 3D BIM model for an educational building has been used to derive the indoor graph. The 3D model has been built in Revit software to extract the different types of information for each space, such as space name, space number, function, area, height, level, and space location (XYZ). A database was then created in PostgreSQL/PostGIS to store all the information and create the 3D graph using the pgRouting extension. Finally, the 3D geospatial web-platform 'Cesium JS' has been used to visualize the 3D indoor navigation graph and the optimal path from source to destination. Using a web-based dissemination platform allows every user with a web Brower on the laptop, tablet, or mobile to use the indoor routing application. The proposed application will provide a better understanding of the indoor environment during the navigation for the types of users.