Title:

Designing 3D Geographic Information for Navigation Using Google Glass

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Abstract:

No longer bound by traditional 2D physical representations, there is a steady shift towards three-dimensional data (3D) allowing for a less abstract version of the real world. In the last decade the stratospheric rise of smartphones and mobile navigation applications has changed the way we navigate. Existing research recognises landmarks to be important navigational cues but specific geometric and semantic attributes most salient for 3D representations have not been identified. This study offers a user-centred investigation into assessing of the saliency of environmental objects which facilitate pedestrian navigation in the real world. A novel real world navigation experiment using Google Glass was carried out with fourteen British 20-30 year olds (n=14) to elicit data requirements. Each participant were instructed to follow a route on the map provided with no time limit and were asked to produce a set of written instructions. Concurrently, a custom application written for the Google Glass captured video, sound as well as gaze vector of the user. Results indicate that geometric and semantic detail are most pertinent for navigation between 1.65 – 7.5m for buildings. Visual characteristics such as colour, shape and texture are more relevant than function and use. From the findings a preliminary minimum specification for 3D GIS data specific for navigation can therefore be proposed. The study is designed to be iterative, whereby a 3D data would be produced from the above specification and tested in further navigation exercises. In addition, this study provides an insight into the problems and difficulties faced in conducting 3D experiments and its subsequent analysis. Where 2D is insufficient in analysing the data collected, the deficiencies in the current state of 3DGIS tools and datasets are also exposed. Future work with larger samples from different cultures and ages would be desirable as well as with more refined 3D tools.