Constructing and Evaluating a Building Facade Color Map for Urban Navigation

by **Luka Laval**

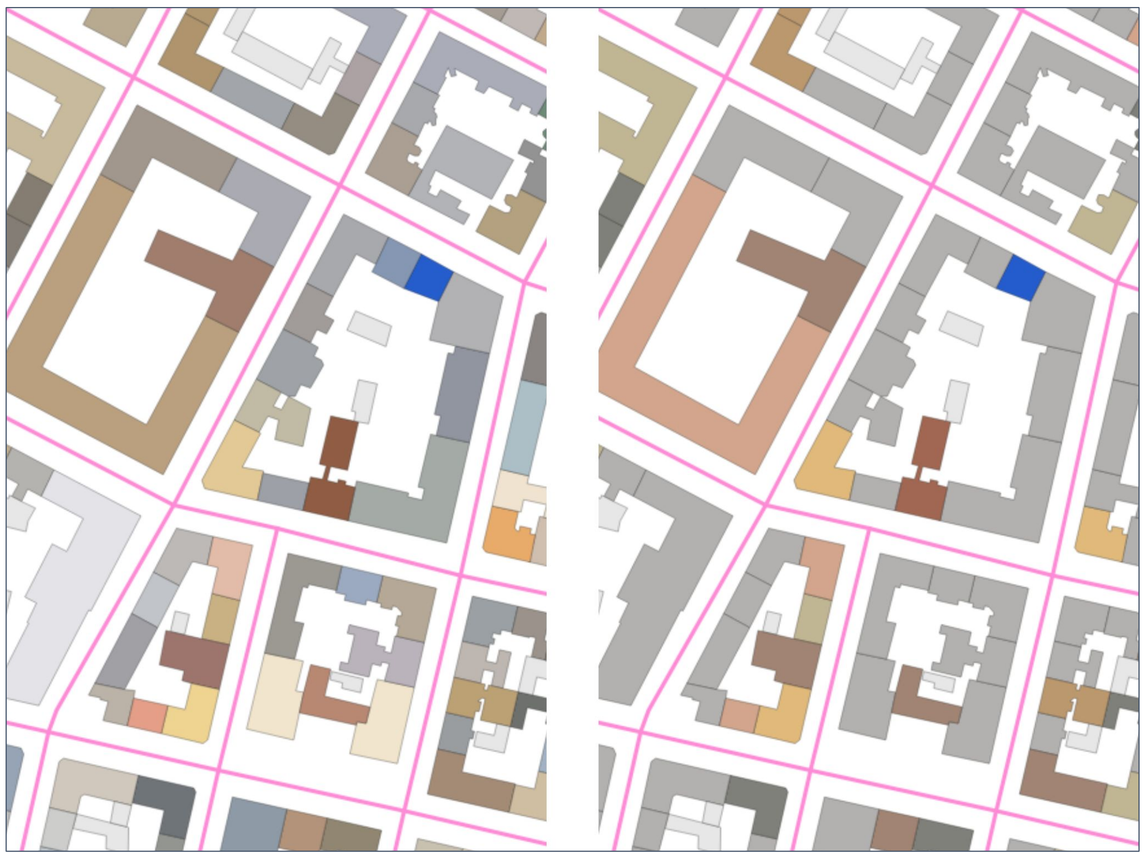
Building facade colors are potential cues for navigation in urban environments. Buildings are used as landmarks [1] and are often characterized by the colors of their facades [2]. This thesis consist of constructing and evaluating a building facade color map. A procedure to construct an interactive 2D building facade color map is proposed. Additionally, a color generalization algorithm was implemented to simplify the map across scale. Finally, the constructed map was evaluated against a map with gray buildings on navigation tasks in a virtual environment.

Map construction

Building facade colors are collected using a color picking tool on street level imagery, and assigned to each building footprint using QGIS.

A color generalization algorithm, inspired from image compression methods, reduces the amount of colors on the map by grouping similar colors using the MeanShift clustering method in the human perception friendly CIELAB color space. Parameters are changed to vary the distance threshold and the generalization level.

Finally, the generalized layers are displayed successively according to the zoom level.

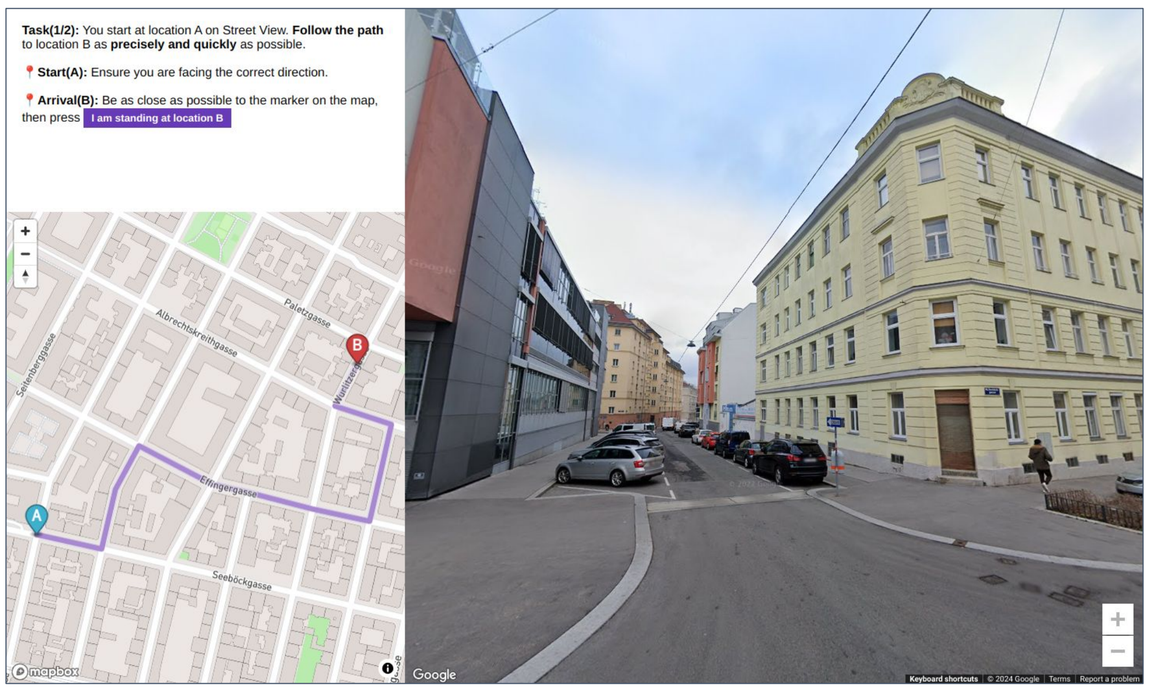


Building facade color map with and without color generalization (left: original colors; right: generalized colors)

Map evaluation

A user testing platform embedding Google Street View as a virtual environment was created and shared online.

The map was evaluated against the same map with buildings displayed in one shade of gray. The maps are compared on wayfinding tasks performances. Participants were tracked in the virtual environment while following a route displayed on one of the maps.



User testing platform interface for the navigation task. Participants are instructed to follow the route displayed on the map (left) in Google Street View used as a virtual environment (right).

Results

Results showed no significant difference in the performances on both maps. Participants stayed on the route similarly, participants arrived at the final location similarly, participants had a similar observational behavior using both maps.

Nevertheless, participants reported to feel more confident when using the building facade color map as opposed to the gray map. However, the amount of information on the building facade color map was reported to be too high.

Conclusion

This research does not reveal a significant advantage of using the building facade color map. Nevertheless the components of the created map must be individually evaluated (building facade colors, color generalization).

Future research and map constructions using building visual characteristics is encouraged. And a thinner analysis of the detailed participants path generated during the performances is suggested.

The new color generalization algorithm should be properly evaluated and further developed.

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