Verification of Cartographic Communication Models Using Detection of Map Reading Strategies Based on Eye Movement Recording

Marketa Beitlova, Stanislav Popelka, Martin Konopka & Karel Macku

Abstract

The aim of this paper is to introduce a method that can be used for the verification of cartographic communication models. The authors of the maps were placed in the role of the users of their maps. Then, eye-tracking was utilized to reveal their map reading strategies and compare them with the strategies of other cartographers and cartographic novices. The crucial part of the data analysis was scanpath comparison using the sequence of visited Areas of Interest, which helped quantify map reading strategies' similarity. The use of the same strategy as the map author used might be a prerequisite for users' proper understanding of a map reflected by the overlap of the author's and users' realities in Koláčný's model. The overlap was considerable in most cases; however, exceptions in which authors used a different map reading strategy were identified.

An Empirical Study on Interfaces for Presenting Large Sets of Point Features in Mobile Maps

Sven Gedicke & Jan-Henrik Haunert

Abstract

This paper presents an empirical study assessing the usability and utility of different interfaces for visualizing large sets of point features in mobile maps. We focus on interfaces that present only a subset of all features and provide interaction functionalities for browsing through all of the information. We compare an established zoom-and-pan interface against three recently proposed interfaces that do not require a change of map scale or section. Each of the novel interfaces implements one additional, specialized interaction functionality for presenting all information without the need to zoom or pan. As a first step towards user-centred design, we investigate how well the specialized interactions are adopted by users. Given a visual search task, we show that participants performed significantly fewer zooming and panning operations using the novel interfaces than when using the zoom-and-pan interface. Further, we observe advantages in terms of search accuracy and the extent of the visible map area.

A Displacement Algorithm Considering Geometry Constraints to Resolve Spatial Conflicts between Roads and Buildings

Jingzhen Ma, Qun Sun, Li Xu, Shijie Sun & Bowei Wen

Abstract

Displacement is the most commonly used method to resolve spatial conflicts, but it creates difficulties in maintaining consistency in the spatial distribution pattern of building groups. In this study, a geometry constraints-oriented approach is proposed. First, buildings were classified according to the degree of encirclement by roads. On this basis, considering the road mesh as a unit, the minimum spanning tree was used to establish relationships between buildings and identify the structure of building clusters. In addition, the force received by the building was analyzed to determine the distance

and direction of displacement. Owing to area constraints, buildings were scaled down to solve the problem of insufficient displacement space. Distance, direction, and area indicators were chosen as geometry constraints to conduct the displacement. Our results showed that the developed approach can effectively resolve spatial conflicts between roads and buildings, while maintaining the distribution pattern, and it is therefore a promising solution.

Notes on the Eisenlohr Projection
P. 56-64

Daniel Strebe

Abstract

Friedrich Eisenlohr presented a map projection in 1870 that is optimal for a conformal world map of the sphere interrupted along an entire meridian. The projection has received little attention in the literature despite its theoretical importance. This paper gives alternative formulations for the projection and its scale factors and develops an efficient inverse for the projection.

A Proposal for Multi-scale Topographic Map Symbols for Roads and Buildings in Brazilian Urban Areas

Victor Silva de Araujo, Andrea Faria Andrade and Silvana Philippi Camboim

Topographic maps are widely used to provide geospatial information on digital environments, and the principles of cartographic communication positively impact its design. This paper proposes new road and building symbols in mapping Brazilian urban areas, aiming to increase the effectiveness of map-reading tasks (MRTs) in a multi-scale context. For this purpose, colour theory and semiotics were applied to develop new symbols and a remote test through an adapted think-aloud protocol. The results showed that users performed better with the proposed symbols than the previous ones.