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The Map of the Coatzacoalcos River (1580): The First Cartography of the Isthmus of Tehuantepec

P. 167-186

Manuel Morato-Moreno & José-María Gentil-Baldrich

Abstract

The Coatzacoalcos River is one of the most important rivers in Mexico. The oldest map of this river was drawn by Francisco Gali in 1580. Unlike most maps made in New Spain in the last quarter of the sixteenth century, this map is purely European in style and is somewhat reminiscent of a nautical chart. Analysis of the map suggests that it was made hastily. Both the errors in the distances and the numerous corrections that can still be observed support this conjecture. It seems that Francisco Gali was more interested from his point of view as an explorer and navigator in the most important aspect of the region: the possibility of connecting the North Sea and the South Sea through the Strait of Tehuantepec. In this respect, the map of Coatzacoalcos would have been drawn to show the viability of using the river as an interoceanic passage.

A Comparison of Machine Learning Methods Applied to the Automated Selection of River Networks

P. 187-202

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Abstract

Machine learning methods are increasingly used in the automatic generalization of river networks, but previous research lacks a comparative analysis of different methods using the same data set. This innovative study considers eight river network indicators, such as river length, river grade, river spacing, seasonality, connectivity, catchment area, tributaries at the next grade, and total number of tributaries, which can precisely describe the characteristics of the river network. The experiments were carried out and automated selection of river network was established based on back-propagation neural network (BPNN), support vector machine (SVM) and decision tree (DT) methods. We established that BPNN and SVM have high selection accuracy, but the parameters are complex. SVM is more suitable for small samples. In addition, DT has unique advantages due to its visualized tree structure and the characteristic of derivable rules. We hope that this study will provide a reference for the selection of river generalization methods in the future.

A New Map of the World's Hydrosphere

P. 203-219

Duncan Cameron & Krisztián Kerkovits

Abstract

This paper presents the Cameron Aquatic Projection, a novel concept designed to depict the world's surface hydrosphere as it is, a continuous unbroken unit including oceans and rivers. After a review of related past projections, the paper will describe the parameters of the projection, according to the existing layout of surface water on Planet Earth. This description of the design principles is followed by the mathematical realization of the proposal. The article concludes with completed examples of the projection and suggests future applications.

Abstract

While dockless bike sharing is gaining popularity, oversupplied and poorly maintained bikes introduce chaos and waste (e.g., so-called zombie bikes that unused). Spatiotemporal pattern visualizations can help policy-making and infrastructure improvement (e.g., allocating parking areas). However, multivariate symbolizing (e.g., supply, flow, usage) to optimize dockless bike sharing is challenging. In this paper, we introduce metaphor theory to design multivariate symbols. First, we systemically explore the coupling of three metaphor types (orientational, ontological and structural) with symbols at three levels of iconicity. Then, we construct metaphorical symbols for optimizing dockless bike sharing following a user-centred design process. We also offer an evaluation using eye-tracking and questionnaire techniques. The results indicate that, compared with bin-packing and multiview symbols, metaphorical symbols significantly improved effectiveness and efficiency, and reduced participants' cognitive load. Our evaluation presents preliminary evidence that metaphors can offer new organizational mechanisms for map symbols to represent multivariate naturally and effectively.

Guidelines for Standardizing the Design of Tactile Maps: A Review of Research and Best Practice**Abstract**

Accessibility to tactile maps is limited due to their expensive and time-consuming development. Acceleration of their production requires standardized design guidelines that consider symbol design and production methods. In this paper, based on a review of research and best practice, we summarize knowledge on how to design tactile maps properly and provide a selection of highly legible, recommended symbols for the compilation of tactile maps. We also examine generalization constraints and other design parameters that are necessary for the standardization of tactile mapping. Finally, we explore differences in tactile map design depending upon the selected production method. Over the years, many useful guidelines have been developed although they remain unknown to the wider audience. There is still a long way to go in creating a global standard for the design of tactile maps.
