Sliding from imagery realism to topographic abstraction

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Abstract
As the amount of cartographic representations dramatically rise, cartographers are incited to merge them into mixed cartographic representations. We identify two widespread design trends among such representations: a higher level of realism and an increasing use of imagery background. Moreover, current geovisualization applications provide interactive covisualization tools such as sliders, swipes, magnifiers, lenses or anchored windows that allow users to explore two cartographic representations simultaneously. Some related research works focus on the realism level of cartographic representations, while designing semi-realistic symbols (Jenny & Jenny 2014, Patterson 2002) or while integrating imagery data (Raposo 2014). Indeed, (Boer et al. 2013) foresee the impact of the realism level on the fitness for use of such representations.

Our work aims at creating a cartographic continuum enabling users to navigate from an imagery based representation to a topographic map. An important issue of this work is to provide automatic design methods to build in-between cartographic representations. It takes up different challenges. First, we intend to preserve the readability of relevant cartographic elements in each in-between representation. Second, we aim at providing smooth transitions ensuring the continuity between consecutive representations of our continuum. Finally, we look for adapting promising computer graphics rendering methods such as texturing, shading or blending modes to our design issues.

We propose elementary rendering methods to rise these design challenges. Progressive symbolization methods allow smooth transitions by using progressive transparency or procedural texturing methods, or by applying color morphing between, on the one hand, bright and artificial map colors and, and on the other hand, natural and unsaturated imagery colors. Adaptive symbolization methods provide road or label symbolizations that are locally contrasted regarding imagery background colors. The objective is to take into account the visual diversity and complexity of imagery backgrounds.
Our elementary rendering methods provide symbolization specifications for each cartographic theme independently, or depending on the background layer. In order to create a consistent cartographic continuum and build complete in-between representations, these elementary methods have been combined into a global cartographic process. The calibration of the relative realism levels our elementary rendering method outputs have been guided by a user visual test in order to ensure an homogeneous level of realism for the whole representation.

Our work further contributes to the formalisation of the concept of in-between cartographic representation which could be used to build other continuums (through seasonal representations or artistic styles for exemple), the proposal of cartographic rendering methods inspired by computer graphics and the conception of geovisualization tools to browse in-between representations from a topographic map to an imagery based cartographic representation.

References
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