Journées de l'Association Française d'Informatique Graphique, Reims Image 2014

Contributions to Geovisualization for Territorial Intelligence

R.M. Donolo[1] and R. Laurini[1,2]

[1]INSA de Lyon and Università degli Studi di Roma Tor Vergata
[2]INSA de Lyon

Résumé

This PhD research work is placed in the domain of Geovisualization used to implement Territorial Intelligence and decision support systems. The objective of the research was to find an empirical method (an online test) for the evaluation of visual variables, in order to develop Territorial Intelligence.

Mots clé : Territorial Intelligence, Visual Intelligence, Geovisualization

1. Introduction

This research work was born through the establishment of an agreement between Tor Vergata University, Rome, and INSA (Institut National des Sciences Appliquées), Lyon. The motivation that led us to deal with this research topic was the perception of a lack of foundations and standard methods in the evaluation of spatial data design.

2. Description of the Experiment

The experiments proposed in the proposed set of tests should consider different typologies of data, different environmental contexts, different indicators and methods of representations, etc., in order to support expert users in decision making, in the urban and territorial planning and in the implementation of environmental policies. One of the most common problems in Information Visualization is to represent data in a clear and comprehensible way. Spatial data have a complex structure that includes spatial component, thematic attributes, and often the temporal component. Actually there are limited scientific foundations to guide researchers in visual design of spatial data, and there are limited systematic and standard methods to evaluate the effectiveness of the solutions proposed. In this Phd research an empirical evaluation test is proposed to assess the effectiveness of some map displays, analyzing the use of three elements of visual design: 1. the spatial indicators to be represented and their context of visualization, 2. the physical dimensions of map displays, 3. the visual variables to represent different layers of information. We have elaborated two tests, one for each indicator displayed (and for its context of visualization); the three indicators are: the flow of passengers in a subway map, the temperature displayed on the facades of a building. The physical dimensions chosen for the map displays of these indicators are respectively, 2D and 2.5D. This approach is mostly based on user's perception about visual variables and can be considered an application of a bottom-up visual saliency model; the input stimulus is given to the observer through the use of four visual variables: color, value, texture and size; each visual variable represents an indicator in a different moment. Visual variables are first used separately to represent the indicators at different times, then are combined increasing the difficulty of the interpretation of the maps. The results of the tests suggest which visual variable is the most efficient (fastest to understand) and which visual variable is the least efficient (less fast to understand).

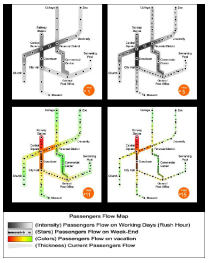

Figure 1: *Different representations of a Metro system using different visual variables;*

3. Conclusion

This empirical experiment on visual variables is a prototype and could be extended to different contexts, scenarios and applications to provide more general indications about perception and understanding of visual variables and their combinations, but could also give indications about trends and critical points in the interpretation of different map displays. With these empirical tests we would like to suggest an approach to individuate preferences and problems in data visualization, in order to improve the understanding of data visualization and to simplify the interpretation of data for improving private and public decision making and Territorial Intelligence.