

A missing link in cartographic visualization? A case study of “heat maps” effectiveness.

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Abstract:

For several years, especially in Internet cartography, we have been observing the increase in the popularity of so-called “heat maps”. It is a visualization method of “geospatial data on a map by using different colours to represent areas with different concentrations of points – showing overall shape and concentration trends” (Yeap and Uy 2014). Such maps are used primarily when topographic presentation of the phenomenon is impossible due to its high concentration or too small graphical capacity of the map. It is important, however, that “heat map” shows the phenomenon within its natural spatial context, and thus does not limit the presentation only to the statistical boundaries as choropleth maps do. “Heat maps” have not yet been thoroughly studied within theoretical cartography (Netek et al. 2018) and neither their effectiveness has been measured in the context of varieties of this method (generalization, colour schemes, transparency, basemap, etc.).

The aim of the paper is twofold. Firstly, to propose a coherent definition of this presentation method, as well as to place it among other, yet well-established methods such as isolines, choropleth maps, dasimetric maps and dot maps. It is also important to discuss this method in the context of the input data, types of data transformation (e.g. methods for estimating the density of the phenomenon), the applied colour schemes and generalization.

Secondly, a part of empirical study will be presented in the context of “heat maps” effectiveness. It will be taking under consideration such variables as generalization (4 different kernel radius values calculated in pixels) and type of method (“heat map”, choropleth map, dot map and single symbol map). 7 maps were thusly elaborated along with 7 questions based on different interaction primitives such as: compare, retrieve value, cluster or identify (R. Roth 2013) which gives an overall matrix of 49 map sets. Also, questions are designed in order to reflect two level of map reading: general and detailed. Correctness and time of answers are measured as depended variables. Moreover, after each question participants assess its difficulty and at the end of the questionnaire they are asked about their preferences (in terms of different “heat map” radii and methods) which allows to compare them with the results of the effectiveness study. Such elaborated empirical study will let us answer questions related with “heat map” effectiveness when comparing different radii and different methods.

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