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The Envision of Representational Spectrum of Pan-maps in the ICT era

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Abstract:

In the natural world, both light spectra and sound spectra exhibit characteristics of continuous transitions. The light spectrum, based on the wavelength variation of electromagnetic waves, can form a sequential and continuous distribution of ultraviolet light, visible light, infrared light, microwaves, and so on. Similarly, the sound spectrum, based on different frequencies, transitions continuously from infra-sound to sounds audible to the human ear and further to ultrasound. We can observe that the concept of "spectrum" effectively reflects the complex interconnections between objects in the real world.

In the field of cartography, traditional maps, due to technological limitations, mostly express the spatial distribution of scene objects from a single and discrete perspective, such as administrative maps, topographic maps, geomorphologic map. In recent decades, with the rapid development of information and communication technology (ICT), there have been significant changes in the theoretical methods of cartography and technological conditions in which they mature. Map-making technology has continuously innovated, resulting in a wide variety of map-like representations that differ from "traditional maps" in terms of objectivity, intuitiveness, measurability, and comprehensiveness, such as whisper map, kriskograms map, virtual reality map (VR map), etc. Maps exhibit significant characteristics and trends of diversification, and Guo collectively referred to traditional maps and various innovative map forms as Pan-maps.

This paper focuses on the diverse characteristics and trends of Pan-maps, drawing inspiration from the continuous expression of spectrum. It aims to break through the discrete nature of traditional maps and attempt to connect maps that express diversity, multiple types, and multiple themes. The paper proposes a representational spectrum of Pan-maps (as shown in Figure 1). In the ICT era, the visual form of maps is moving towards the development of high precision, realistic representation on one end and abstract and suggestive representation on the other end. This means that Pan-maps can have a realistic or abstract representation. Realistic representation emphasizes the "similarity in form" between the Pan-map results and the objects being represented. The visualized map results closely resemble real geographic scenes, aiming to realistically reproduce the real-world geography as faithfully as possible (Figure 2). Abstract representation emphasizes the "resemblance in essence" between the map results and the objects being represented. The map results are no longer constrained by accurate positional representation but are guided by the purpose of map application, focusing on suggestive representation of the map's theme to achieve the goal of simple, efficient, and intuitive expression of key information (Figure 3). The concept of representational spectrum of Pan-maps proposed in this paper helps break the discrete thinking of traditional maps, broaden the research scope of cartography in the ICT era, and to some extent, promote the development of cartographic science.

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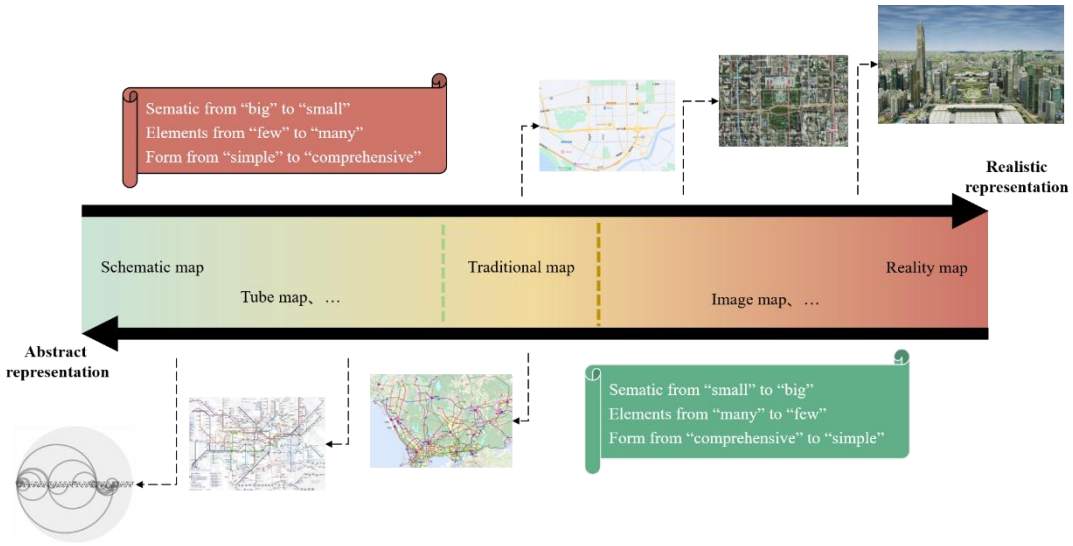

Figure 1 Representational Spectrum of Pan-maps.

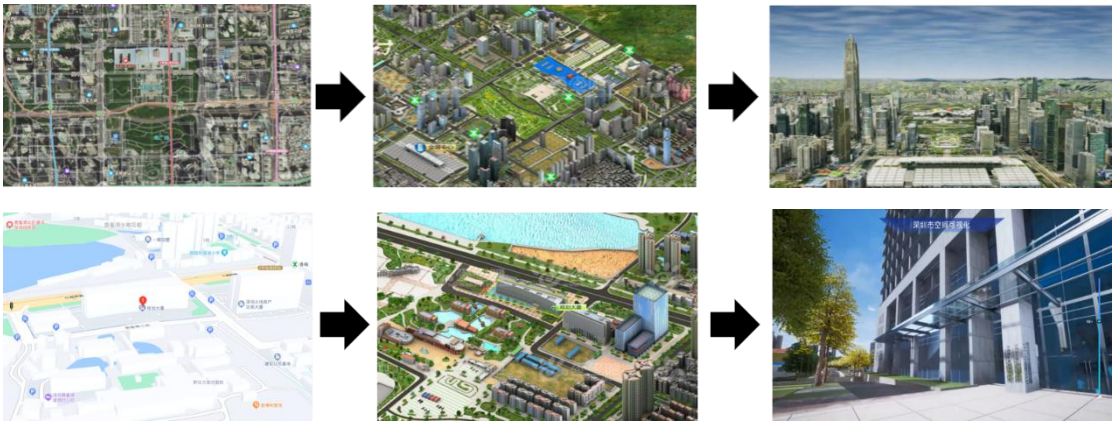

Figure 2 Continuous Realistic Representation of Pan-maps.

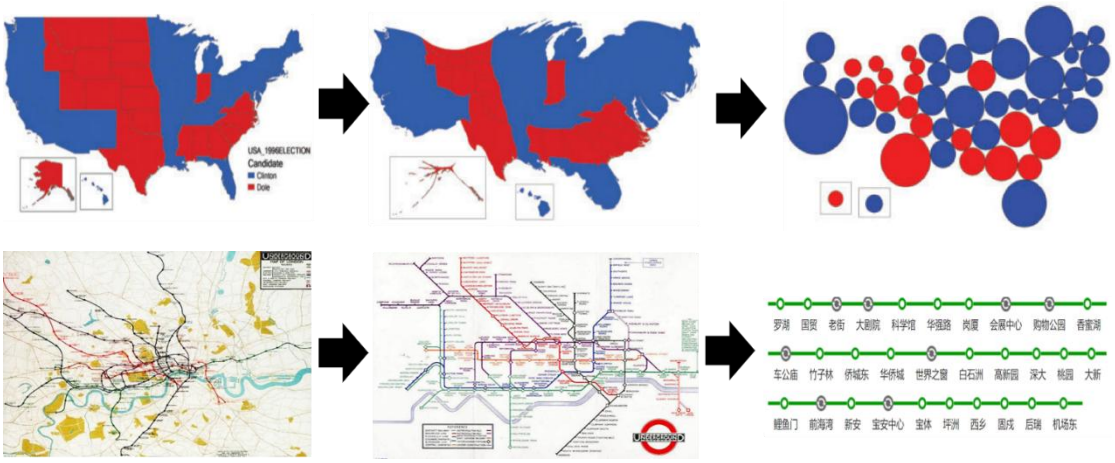

Figure 3 Continuous Abstract Representation of Pan-maps..

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