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Mapping with a Sense of Place: Methods for Generating Place-Specific Map Colors and Symbols

Shangjing Jiang [a,*], Yong Wang [a], Mingguang Wu [b]

[a] *Chinese Academy of Surveying and Mapping, jiangshangjing@casm.ac.cn, wangyong@casm.ac.cn*
[b] *Nanjing Normal University, wmg@njnu.edu.cn*

* Corresponding author

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Abstract:

Maps play an important role in conveying the character and atmosphere of places. As the experiential and affective dimensions of cartography receive increasing attention, maps that evoke a sense of place have become an important topic in cartographic research and design. Existing approaches, many of which draw on expert knowledge and careful manual design, have demonstrated the value of color and symbolization in expressing local identity. However, these approaches are often difficult to formalize, reproduce, and adapt efficiently across different places and mapping tasks. To fill this gap, we propose two generation methods for creating place-specific map colors and symbols. The first is a place-specific map color generation method based on crowdsourced images. Place-related images are used as a source of local visual characteristics, from which representative colors are extracted through image filtering, semantic segmentation, and color clustering. A multi-objective optimization model then generates map color schemes by balancing place representativeness, aesthetic appeal, and cartographic legibility. The second is a place-specific landmark symbol generation method based on a diffusion model under cartographic constraints. By incorporating structure-consistency and color-consistency losses, the method improves controllability and visual fidelity while suppressing common problems such as shape distortion, color drift, and unstable details. It supports multimodal conditioning through text prompts, sketches, and reference images, enabling flexible yet consistent generation of landmark symbols with strong local identity. To evaluate the proposed methods, the generated colors and symbols were integrated into sense-of-place maps and compared with functional maps and aesthetic maps. The results show that the proposed approach preserves information transmission quality while more effectively evoking a sense of place. This research introduces a framework for mapping with a sense of place.

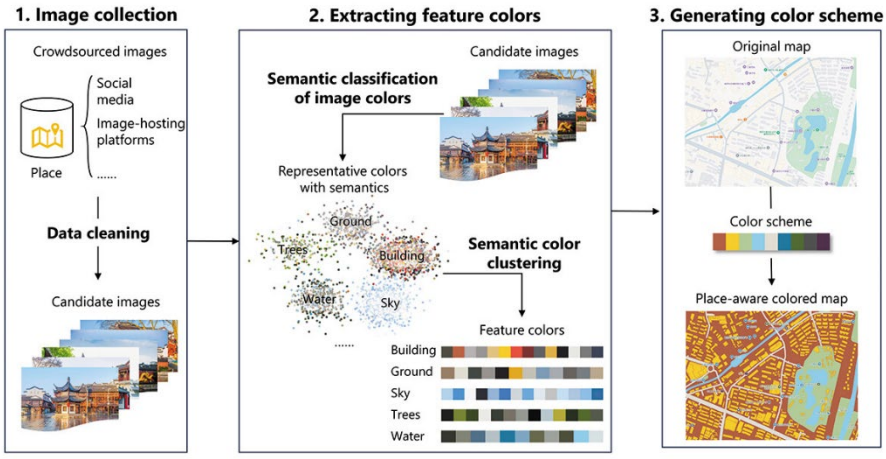

Figure 1. Workflow for generating place-specific map colors.

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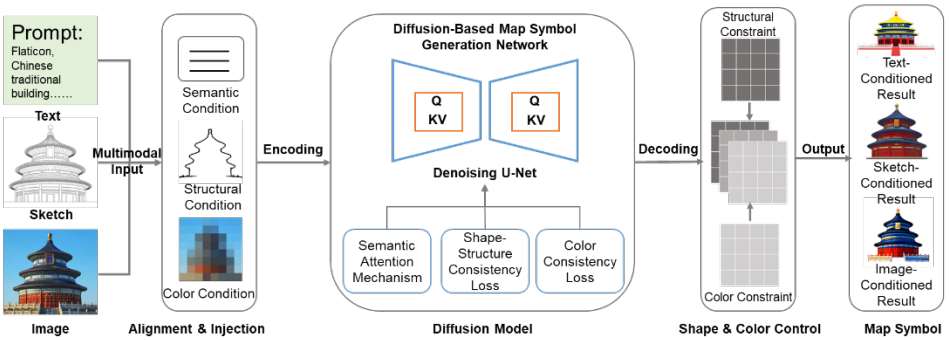

Figure 2. Workflow for generating place-specific map symbols.

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