
Research on Natural-Language-Triggered Automatic Generation of Disaster Maps

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Abstract:

Disaster mapping plays a critical role in emergency response, situation assessment, and public communication. However, conventional disaster map production often relies on manual workflows, making it difficult to respond efficiently to rapidly evolving disaster situations and diverse user needs. With recent advances in natural language interaction, multimodal information processing, and intelligent cartography, natural-language-triggered automatic disaster map generation has emerged as a promising direction for improving the timeliness, adaptability, and accessibility of emergency mapping services. This study proposes a technical framework for the automatic generation of disaster maps based on natural language input. First, a disaster map element composition and information model is constructed around the relationships among disaster type, application scenario, and map elements. This model provides a foundation for organizing map content according to different hazards, user roles, and task contexts. Second, a natural-language-based cartographic intent understanding and task modeling method is developed to identify key information from user queries, including hazard type, spatial extent, mapping data, thematic focus, and service objectives, and to translate this information into executable cartographic tasks. Third, to address the complexity of data sources required for disaster mapping, a multimodal data retrieval and matching method is designed to automatically discover, filter, and associate heterogeneous data, such as remote sensing imagery, monitoring data, base maps, disaster-related thematic geographic features, and textual information. Fourth, an automatic map style generation method is proposed to adapt map symbols, colors, layer organization, and layout design to hazard characteristics, user cognition, and application scenarios, thereby improving both information communication and situational suitability. Finally, a usability evaluation framework is developed from the perspectives of task performance, information delivery quality, response efficiency, and user experience. The proposed study aims to establish an end-to-end framework from natural language input to disaster map generation and evaluation. It provides methodological support for intelligent emergency mapping and offers a new perspective for natural-language-triggered thematic map generation.