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Multimodal metadata search - towards an integrated cartographic and natural language search interface for environmental management.

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Abstract:

In this paper, I will present the development and implementation of knowledge graphs as a central tool for enhancing search and discovery functionalities in the domain of environmental management, specifically for water resources in Europe as part of the AquaINFRA Horizon project (European Commission, 2022). Marine and freshwater datasets from EU sources are collected and structured into a comprehensive domain-specific knowledge graph. This graph will facilitate advanced capabilities such as natural language document querying based on spatially explicit embedding techniques to enable more intuitive and effective data interactions.

The knowledge graph will underpin a multimodal search interface, integrating natural language text input, and keyword filtering facilitated through an interactive map interface. The map will display metadata including spatial extent and descriptions of the datasets, enriching the user experience and understanding of the data. The knowledge graph structure will be defined in iterative collaboration with domain experts in fresh- and marine water through semi-structured interviews and named entity recognition (NER) models based on metadata, ensuring precise and relevant terminology. Spatially explicit knowledge graph embedding techniques will be evaluated for the downstream task of searching and discovering domain datasets based on information available through their available metadata.

Following the development, a user study will compare the efficiency of the multimodal interface to a baseline search interface based on string matching. Evaluation metrics will include time-to-completion, number of user interactions, and the relevance of final data selections. The intended users are experts who might benefit from easier access across to data across specific water domains. It is anticipated that, although the multimodal interface may require more interactions, it will yield higher quality and perceived relevance of search outcomes.

The results of this study will provide insights into the design of future multimodal search interfaces based on knowledge graphs, ultimately contributing to better data accessibility and decision-making in environmental management.**:**

References

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