Collaborative Metadata: The Need for Reputation

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Abstract. The web is an important source of geographic information (GI) usable for participatory GIS (PGIS). Discovery of its metadata is a challenging task, but can be facilitated with the help of semantic web technologies. The collaborative creation and maintenance of ontology-encoded metadata requires experience, which is usually marginally present in open web communities. Reputation is proposed as measurement of experience and can be used to permit or restrict access to operations modifying the ontologies.

1 INTRODUCTION

Creating comprehensive and balanced maps for spatial decision making, e.g. in urban planning, is more efficient if the local population is involved in this process. They have the local knowledge to ensure a more accurate representation of the area, and they have a great interest to be considered. The resulting decisions might directly affect them or their neighborhood after all. The combination of public participation and spatial planning is subject of the research on PGIS (Rattray 2006).

Popular user-centered online mapping applications like the *MyMaps*-Feature in Google Map[1] helped that more and more people are familiar with basic map interaction these days. Community-based GI is therefore an important aspect of PGIS these days. Relying on the web as information source even widens participation and influence of potentially involved people (Cara et al. 2000; Tulloch 2007). But the often observed lack of elaborated descriptions impairs its usage (Rattray 2006). We argue that a collaborative effort for the creation and enrichment of the metadata can improve the usability of GI for PGIS. Reputation is presented as one aspect to ensure quality and consistency.

2 ONTOLOGY-BASED METADATA

Geographic Information Retrieval (GIR) relies either on search engines crawling the web for information or on catalogs which usually require ma-

[1] Try it out at http://maps.google.com

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nual registration. Both approaches depend on elaborated metadata. Finding GI is otherwise facing problems which "manifest themselves in various ways, including poor recall, poor precision, inconsistency of search results, ambiguities and so on" (Barton et al. 2003). Search engines are usually restricted to keyword-based searches; catalogs enhance this functionality by extending queries with spatial filters. But compared to the promised benefits of information retrieval techniques used for the semantic web (McGuinness 2004), search engines or catalogs are not efficient enough.

Encoding the formerly schema-based metadata records in ontologies (Schuurman and Leszczynski 2006) and having the facilities to annotate them with concepts denoting the real world (Klien et al. 2007) builds the foundation for semantically enabled GIR. Sophisticated query formulation using domain ontologies and reasoner-supported query processing make more precise queries and better rates of recall feasible (Egenhofer 2002). The ontology engineering process – gathering and formalizing the relevant concepts – is a challenging task, even for professionals and experienced catalogers. But in open and dynamic web communities, we need to let skilled community members perform the semantic annotations. The approach investigated here is to infer the user's experience from the history of past interactions and let only qualified user perform critical operations with far-reaching effects.

3 REPUTATION

Reputation is build upon the history of past interactions happening between members of one community. The "other party's abilities and disposition" (Resnick et al. 2000) are the features reputation depends on and why it can be used to estimate the risk of future interactions. EBay's rating system[2], used to assess the credibility of auctioneers, is a well-known example for a reputation system. Within a catalog for GI, multiple actions can be logged and analyzed to infer reputation of the participating users. Metadata can be created, extended and modified. The described data can be rated, tagged, discussed, annotated, and more. Some actions, like tagging, are explicit. Relevance feedback on the other hand is an implicit action. Both affect a user's reputation value, which is used for the following tasks:

1. It can be used to assess the experience of the contributing user. The effects and quantity of a user's past interactions show how familiar a user is with the system, and if he can be trusted with more complex, but also more effective methods to enhance metadata.

[2] More information here: http://pages.ebay.com/services/forum/feedback.html

2. It indicates the spatial knowledge of the contributing user. If the content of the user's past maps were correct and detailed, he probably has local knowledge. High reputation of all contributing users makes the produced GI therefore more credible.
3. It acts as sanctioning device to avoid moral hazards (Dellarocas 2006). Detected incorrect modifications or contributions by a user have a negative impact on his reputation, and restrict, as consequence, his access to less important operations.

4 CONCLUSIONS

Acquaintance can have an impact on decisions. User might prefer maps of a friend to perhaps better maps of unknown user. Current work investigates a model which is able to capture explicit and implicit actions and their effect on the reputation. Moreover, the model incorporates the social network reflecting the connection between users of the community as well as the overall reputation of a single user. A catalog providing a set of basic user feedback techniques like relevance feedback or tagging will be implemented to test the model. We believe that gaining reputation to get access to higher-level operations (like semantic annotations) can be a sufficient motivation for users to contribute to the existing metadata records. And having many users actively contributing is expected to result in elaborated metadata which makes the described GI, at the end, more useful (in terms of credibility and findability) for critical applications like PGIS.

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