Ontology driven VGI filtering to empower next generation SDIs for disaster management

Saman Koswatte[1]
Saman.Koswatte@usq.edu.au

Kevin McDougall[1]
kevin.mcdougall@usq.edu.au

Xiaoye Liu[1]
xiaoye.liu@usq.edu.au

[1]School of Civil Engineering and Surveying, Faculty of Health, Engineering and Science
University of Southern Queensland, Toowoomba Qld 4350, Australia

Abstract

In modern society, the increased popularity of social media has significantly changed the reporting and sharing disaster related information. The Volunteered Geographic Information (VGI) can be considered as a special case of the more general web phenomenon of User Generated Content (UGC). Interestingly, VGI is more current and more diverse than conventional geographic information, although quality and credibility issues exist. The Spatial Data Infrastructures (SDIs) facilitate the spatial data sharing between organizations to discover, access and use available spatial data. As the mobile communication, information technology and other related infrastructures are changing rapidly, the SDI and its architectures should also be considered in order to develop the next generation SDIs. This paper examines the fusion of VGI and SDI as a possible solution to solving SDI's pressing issues like lack of currency and data incompleteness. As ontologies are self-descriptive knowledge of shared conceptualizations, it is argued that the use of domain specific ontologies can successfully improve data currency and quality. The purpose of this paper is to explore the use of domain specific ontologies to filter VGI to be integrated with SDI data by addressing the above specific problems. A conceptual framework is proposed to filter VGI using domain ontologies. The study approach consists of multiple steps including 1) Special domain specific terminology identification of 2011 Queensland-Australia flood tweets, 2) Crowd sourced disaster management ontology development, 3) Tweet processing and improvable spatial data extraction, 4) Validation and Quality control and 5) Integration with SDIs and disaster management applications. The paper discusses a new crowd sourced spatial data life-cycle and provides a comparison of VGI, SDI and next generation SDIs in terms of data quality, standards, currency and breadth of data together with an approach for ontology driven semantic official data generation.

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