Context Discovery: Developing geo-temporal context from implicit sources to support geocollaborative crisis management decision making

Crisis management activities inherently rely on geographical information, which abounds in open-source channels such as news stories that implicitly contain numerous references to place (e.g., cities, counties) that are not readily accessible or viewable on maps. This information can provide geographical and temporal context to support decision making and situation assessment in geocollaborative crisis management activity in many ways, such as helping to understand varied geographic reactions to a disaster event, develop postevent intelligence about what happened during a crisis and why, aid in collection of information about hazard mitigation discussions underway in various locales, and assess threats and vulnerabilities before disasters happen.

The underlying science problem examined by this research is how visual artifacts and virtual environments can support and mediate the development of geographical and temporal context information as a result of the social process of group work activity. Heterogeneous data sources are combined within a geocollaborative decision making environment named the "Context Discovery Application" (CDA) which facilitates the development of geographical and temporal context. The notion of the “discovery” of context implies that users will be able to find geographical and temporal context information that was previously unknown, and be able to share and synthesize this information with co-collaborators by applying combined expertise to finding relevant information and interpreting results of searches.

Geovisual analytical functionality of the CDA includes automated retrieval of news stories based on a user-specified crisis context, computational processing and visualization of geographic place names and possible relationships between places across user-defined geographic scales over time, formal ontology integration to find potentially relevant non-spatial dimensions within data retrieved, and tightly coupled map displays that allow users to simultaneously view geographical locations in 3D-realistic terrain and standard 2D cartographic perspectives.

Results of a CDA search on news stories related to West Nile Virus in Pennsylvania and shown in Google Earth™: Each place found in the search is connected to the origin point using a line. The thickness of the line indicates the number of times a place was referenced in the story, point symbols represent the geographic scale of the entity found (town, county etc.). The transparency of the line indicates how old the story is relative to the time when the geovisualization was created. These approaches are used to give a quick overview of the information returned before removing unneeded information.

Collaborative map creation in the CDA: Collaborators can co-create each other’s maps through sharing of OGC-standard compliment map layers to support geocollaborative decision making. In this example, a user has received a buffer layer from a co-collaborator. A real-time chat box supports their dialog.

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