

## **Automatic Extraction and Geo-spatial Visualization of FEMA National Situation Updates**

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### Project scope:

Rapid responsiveness is the key of successful crisis management. However, emergency situations may create an overload of information which are difficult to be processed manually. Hence, automatically extracting useful pieces of information from vast sources of textual data is vital for such scenarios. In this project, we study using information extraction and text mining techniques for Visual Analytics. We create a hybrid information extraction system to extract concept maps and spatial-temporal information from text documents using both rule-based and machine-learning methods.

A prototype system has been implemented to create visualization for FEMA National Situation Updates. Daily reports are fetched from the FEMA website and split into several incidents. Each incident then will be classified into topics based on word frequency and tagged with location names. The extracted information is stored in a repository and can be visualized with GIS applications such as Google Map. The system provides an intuitive way to browse and visualize FEMA situation updates. The applications include emergency situation patterns analysis and real-time emergency updates monitoring.

### Recent progress:

1. We have designed a novel algorithm using stripped dependency tree kernels and Support Vector Machine (SVM) to identify relationships among named entities.
2. The Entity Relation Extractor is implemented as Web Services and can be accessed by Internet.
3. We have created a geo-spatial visualization of FEMA National Situation Updates to demonstrate the usability of the Entity Relation Extractor.

### Future plans:

1. Currently, the accuracy of relationship extraction is about 60%. We will design better algorithms to improve the performance.
2. Resolving ambiguous geo-tags with local/city level accuracy.
3. Aggregate disparate data sources to provide a world-wide real-time emergency monitor.

### Publications since the beginning of the project:

1. Chi-Chun Pan, Prasenjit Mitra, Auroop Rattan Ganguly, Relationship Extraction from Text Documents Using Stripped Dependency Tree Kernels, in review.