Research on developing machine learning tools for analysis of online social data to help disaster or crisis management: Case study with data from East Japan Earthquake

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＜要旨＞

The objective of this research is to develop techniques for analysis of large data collected from online social networks based on pattern recognition and machine learning tools for extraction of information. The extracted knowledge can be used for various decision making activities in case of social needs. In this work, a review study has been done on existing methods for social data mining after natural disasters. Previously proposed tools and techniques are used for analysis of social data after East Japan earthquake for helping the victims.

１　研究の概要

Recently social networks are becoming highly popular. People exchange their comments, opinion and information through social networks like microblog, Facebook, twitter etc. after any big event whether social, political or natural. The information can be extracted by data mining tools from large online social data and can be used for developing management strategies for building social infrastructure. Especially, after any natural or man-made disaster, the large volume of social data can help us developing disaster management system. There are lot of machine learning techniques available for analysis of unstructured text data. Based on the available techniques, new methods have been developed in previous years for analysis of social data after East Japan earthquake to extract the basic needs of the victims after a disaster so that better relief services can be provided to them after such an event. In the present work, a framework for advisory message board has been developed for female victims. Also various available techniques for disaster management in different countries based on social data has been reviewed and summarized.

２　研究の内容

A part of the study has been done in collecting current techniques for disaster management used in various countries. A survey also has been done in Indian context for building a disaster management framework. The results are summarized.

In another part of the study, the objective was to analyze twitter, blog data to detect special needs of female victims after great East Japan earthquake. Topic extraction from unstructured texts is recently dealt in text mining problems and well-known techniques are Latent Semantic Analysis (LSA) or Latent Dirichlet Allocation (LDA). LSA, LDA and graph theoretic modularity measures are used for developing methodologies for discovering topics and transition of topics over time from social data after East Japan earthquake to visualize the need of the victims. Social data from women specific bulletin and blogs are analyzed to visualize the specific needs of women victims.

３　これまで得られた研究の成果

The transition of women victim's specific needs over time is shown in Fig.1 in blue color while the red color shows the transition of general needs over time. Fig. 2 represents the framework of general analysis of social data after any disaster.

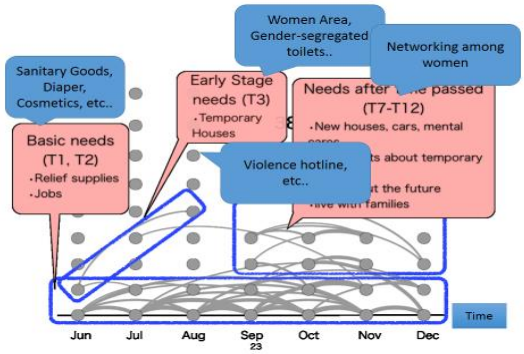

Fig.1：Topic Transition of women victims over time

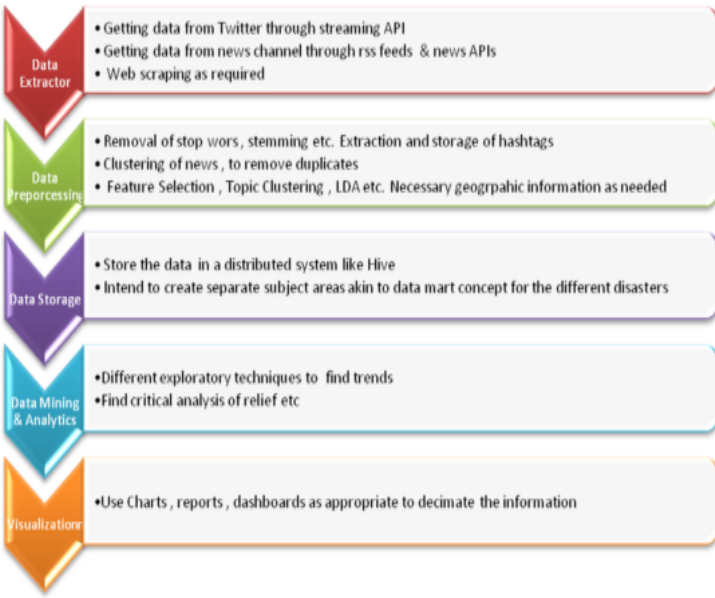

Fig. 2: Framework of a disaster management system

４　今後の具体的な展開

Further development of techniques for information extraction and visualization from social data and practical implementation of the management system is targeted for future work.