

Hazardous Situation Visualization based on Big Data Analysis

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1. Introduction

Specially, crimes are increased socially day by day for feeble person returning home. According to the prevalence of many smart devices to human beings, he/she can gather more useful information with his/her aim and is able to use the information helpfully. If the useful information enables persons to come home safely, the information service system will be very meaningful to them. The useful information will be created through analysis of big data which are widely dispersed around them. In this paper, we propose the visualization for hazardous situations around persons returning home, which is useful for persons which want to come home safely. Generally, the proposed visualization can be implemented by using functionalities of location based services. The most important thing of them is to gather and to analyze data such as news, weather, transportation, and location of users.

Endarnoto, et.al[1] developed Android App for providing traffic conditions, and Kwon, et.al [2] did ChungbukN[2] which is able to access the news related to the physical location of an user. A crime spotting map service [3] in Sanfransico, USA, provides a function for visualizing a variety crime types with themselves colors such as aggravated assault, murder, robbery, and etc at specific locations on the geographical map. However, the services have used offline data so that they cannot provide happened accidents instantly. In this paper, specially, during that persons are come home, we propose a method to visualize hazardous events on a geographical map by analyzing them from big data such as news, weather and transportation.

2. A Method for Visualizing Hazardous Events

Figure 1 shows the procedure of a visualization for hazardous situations which are extracted through analysis of big data such as news, weather, and transportation, which are generated innumerably. Now, we are using Chungbuk ilbo news RSS (Rich Site Summary) for gathering news information related to crimes, where RSS is a format for delivering regularly changing web content. We are gathering weather information provided from a web site(<http://www.kma.go.kr/weather/main.jsp>) of Korea Meteorological Administration and traffic accidents information around the Metropolitan area in Korea provided from Naver Corp. After that the information gathered periodically from the sites is parsed, the results will be stored into MSSQL DB(data base). To analyze the text data, we are using KAIST Korean morphological analyzer called Hannanum [4] which uses Korean sentences as input and analyzes them as morphological units, those are, headwords units of dictionary, and output the morphological units with its part of speech. We use Hadoop to analyze the news, weather and traffic accidents big data stored into the DB in a server and implement a Mapper and a Reducer. The Mapper store actual hazardous data into DB according to the types of hazardous accidents, and the Reducer calculates the number of crimes. Based on the calculated results, crimes, disasters, and traffic accidents according to the classified types will be stored into the corresponding tables with frequency. And also we extract street address of the location where the stored result is occurred, and then store it into the address field of the corresponding table. The address will be translated to the longitude and latitude of the globe by using geocoding.

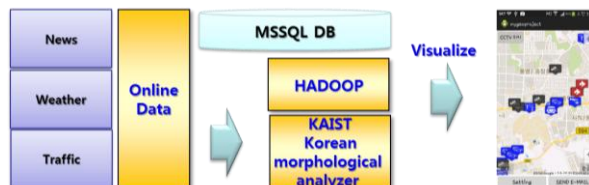


Fig. 1. The procedure of analysis and visualization of hazardous events

Now, we use Geo-fence API to visualize the analyzed data on a Google map, where a Geo-fence is a virtual perimeter for a real world geographic area. The Geo-fence API can establish a perimeter at a location designated by a user, and can give PUSH message to the corresponding user if he/she is placed into the perimeter. The analyzed data will be visualized to the user who enters into the surrounding radius of a location.

3. Visualization Results

In this paper, we classify the types of hazardous accidents as the corresponding icons, respectively. We adopt the icons provided by Google Corp. for general purpose. The used icons are shown in Figure 2.

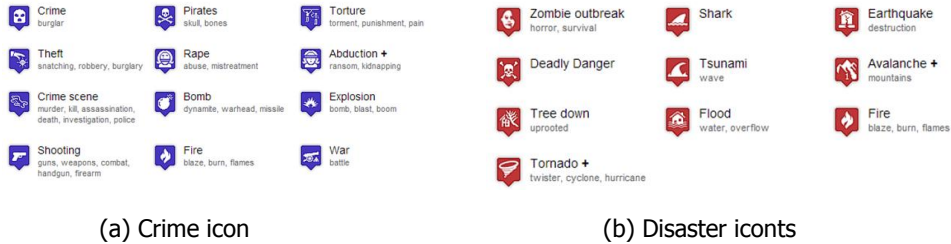


Fig.2 The icons used in the proposed application.

Figure 3 shows three images of a smart phone which are the visualization results for all data, fire data, and car accident data, respectively. Clearly, the data have to be stored into DB after analysis and classification.

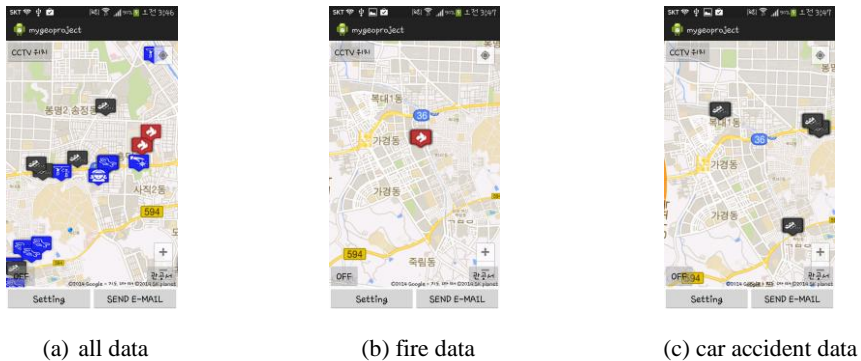


Fig. 3. Three visualization images for analyzed data

4. Conclusion

This paper describes a method for visualizing the hazardous situations on smart devices after analyzing the big data in real time. To do it, we use hannanum morphological analyzer for a gathered data from sites related to news, weather and transportation. The analyzed data within the surrounding area of a user will be visualized on a Google map to give very useful information to the user coming home. Specially, it is necessary for users to provide more data including offline crime, predicted crime, and all crime from all newspapers.

5. Acknowledge

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6. References

- [1] Sri Krisna Endarnoto, Sonny Pradipta, Anto Satriyo Nugroho and James Purnama, "Traffic Condition Information Extraction & Visualization from Social Media Twitter for Android Mobile Application", Journal, Electrical Engineering and Informatics (ICEEI), 2011 International Conference, Indonesia, 2011, pp. 1-4.
- [2] Sun-Ock Kwon, Ji-Seong Jeong, Ji-Hoon Kim, Hee-Ran Kim, Kwan-Hee Yoo, "ChungbukN: An User Location based News Retrieval System", Journal, The Korea Contents Association, 2012, vol.12-12, pp 524-532
- [3] Sanfrancisco Crime Spotting, <http://sanfrancisco.crimespotting.org/map/>, May. 21. 2014
- [4] Hannanum, <http://semanticweb.kaist.ac.kr/home/index.php/HanNanum>, May, 21, 2014