방재를위한 기상 정보 분류

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Classifying Weather Information for Disaster Prevention

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요 약

본 연구에서는 정부에서 제공된 기상 정보와 센서로부터 수집된 데이터를 바탕으로 재난 예방을 조사한다. 첫째, 우리는 데이터 세트를 그룹으로 분류하고 지진, 화재 등과 같은 재난이 발생할 수 있는 비정상적인 그룹을 찾는다. 이러한 분류 방법으로, 미리 정의된 많은 클러스터로 K-평균 알고리즘을 단순히 사용하기만 하면 된다. 두번째로, 우리는 위험한 위치에 있는 사용자에게 mining Data를 employ한다. 실험에서, NET Framework를 사용하여 서버 시스템을 구현하고 클라이언트는 안드로이드 어플리케이션으로 구현한다. 결과적으로, 이 시스템은 재해가 발생할 확률이 높은 도시 지역에 적용 할 수 있는 잠재적 모니터링 시스템이 될 수 있다.

Abstract

In this research, we investigate in disaster prevention upon the weather information provided by government and data collected from sensors. First, we classify the dataset into groups and find abnormal groups which are potential to occur a disaster such as an earthquake, fire, etc. In the classification method, we simply use the K-mean algorithm with a predefined number of clusters. Secondly, we employ the mining data to notify users who are in the dangerous locations. In the experiment, we implement a server system using .NET framework and clients are an android application. As a result, this system could be a potential monitoring system applying in an urban area where disaster has a high probability of occurrence.

Key words
Weather, Urban Disaster, Classification, K-mean, Disaster Prevention

Ⅰ. Introduction

Disaster prevention becomes crucial in the modern life, especially when the world population is increasing steadily. Government and nonprofit organizations are investigating in the problem aiming to prepare and

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protect human, facilities in advance of a particular disaster [1]. In this research, we study the small problem of monitoring weather information and classifying it into groups employing the well-known algorithm, K-mean [2]. Each group specifies the characteristic of its groups. Once an abnormal event occurs in one location of a group, we can deduce other places can happen the same event. Consequently, people can prepare their plan for the occurrence event well. In the next section, we introduce the system and experiment with the collected data. Finally, we conclude the research with future study.

II. System Overview and Experiment

The system collects data from government weather website and from sensors which are located in the different areas in South Korea. In the website, we collect seven parameters which are district name, latitude, longitude, humidity, temperature, wind direction, and wind velocity.

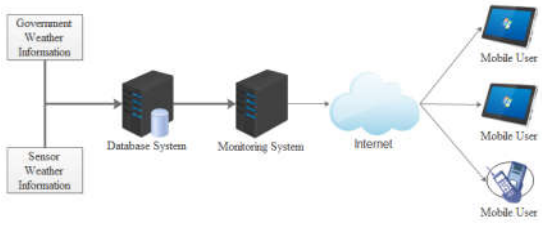

Figure 1: Geography monitoring system overview

From allocated sensors, we manage four information which is humidity, temperature, dust and ultraviolet index. We use sensors to collect information from a location thoroughly because some places do not obtain high measurement accuracy since it is deduced from data obtained from its neighbor locations. As shown in Figure 1, the data is processed in the monitoring system. Here, we use cluster algorithms to classify the weather, geography data into groups. The system also collects data from users. A user can report an occurrence of an event. The system then notifies other users in the same cluster for the unexpected event. In the experiment, we implement the system using .NET framework and clients are an android application. Figure 2 and Table 1 shows one of ten clusters using the K-mean algorithm. It indicates that the cluster contains places where have similar weather information such as temperature and humidity (data collected in 13rd, May, 2018).

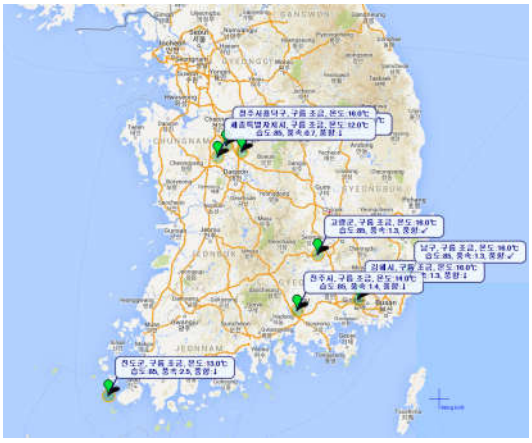

Figure 2: Illustration of a cluster weather information

김해시	35.3143	128.7351	80	16	0	1.3
사천시	35.069	127.8983	85	14	0	1.4
양산시	35.431	128.9774	80	15	0	2
진주시	35.2127	128.0651	85	14	0	1.4
고령군	35.7136	128.2916	85	16	1	1.3
진도군	34.4476	125.9947	85	13	0	2.5
청주시서원구	36.6225	127.4603	85	16	1	0.6
청주시흥덕구	36.6808	127.29	85	16	0	0.5
세종특별자치시	36.5821	127.1928	85	12	0	0.7
남구(부산)	35.4896	129.2826	85	16	1	1.3

Table 1: A cluster contains places where have similar weather information

From the result, we can deduce that though places are far from others, it has similar weather characteristic. We can quickly prepare for a disaster such as a fire in advance once one place already has outbursts. The others can have prevention methods.

III. Conclusion

In this research, we have a glance look at the clustering algorithm in weather monitoring system and how a place relates to other locations by using weather metric. In the future research, we are going to extend this research with deep learning algorithms [3,4] to generalize the system thoroughly.

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