Introduction of Jinghai Xu's Research

Dr. Jinghai Xu, a visiting scholar of the University of Washington, received his Ph.D. in phtogrammtry and remote sensing from Wuhan University in 2006 and finished his postdoctoral research in Institute of Geology, China Earthquake Administration in 2012. Now he is an associate professor of Nanjing University of Technology. He is teaching some GIS related course, including: *Principle of Geographic Information Systems, GIS Software Engineering, Introduction to Mobile Geographic Information Systems, GIS Orientation Course, Spatial Database Building, Programming in C++*. His research is focused on GIS, earthquake disaster information collection, disaster prevention and emergency response.

Earthquakes, an inevitable natural disaster for human beings, are a serious threat to human security and come first among all disasters in terms of casualties and economic loss. For example, the Wenchuan earthquake caused losses of RMB 8451 million and the death of about 87 000 people. Within three days after an earthquake is a vital period for earthquake rescue and often named as "72-hour golden rescue period". The survival rate could be sharply decreased after this period. The rapid and dynamic collection of earthquake disaster information after an earthquake, especially within three days is a key in earthquake emergencies and it is also the foundation of all the relief work.

There are many studies on the collection of earthquake disaster information worldwide. In these studies, the photogrammetry and remote sensing based method is the most widely discussed one. The first use of this method can be dated back to 1906 in the San Francisco earthquake. With the rapid development of remote sensing technology, by now it has already been applied in several real earthquakes, for example, the Niigata earthquake in Japan, the Chi-Chi earthquake in Taiwan, and the Wenchuan earthquake in China.

The Internet based earthquake disaster information collection method is also another important method and has been widely used. The "Did You Feel It?" system is such a typical system that has been developed by USGS. The British Geological Survey (BGS) also use the Internet to develop the "BGS E-Mail Earthquake Questionnaire" system to obtain earthquake disaster data from the public.

Dr. Xu studies a social network based earthquake disaster information rapid collection method by using Geographic information system (GIS) and Global System for Mobile Communications (GSM) technology and try to collect earthquake disaster information. The social network is composed of earthquake disaster information rapid reporters (it also could be consider as a volunteered Network). In our study we call this social network as an earthquake disaster information rapid reporting network.

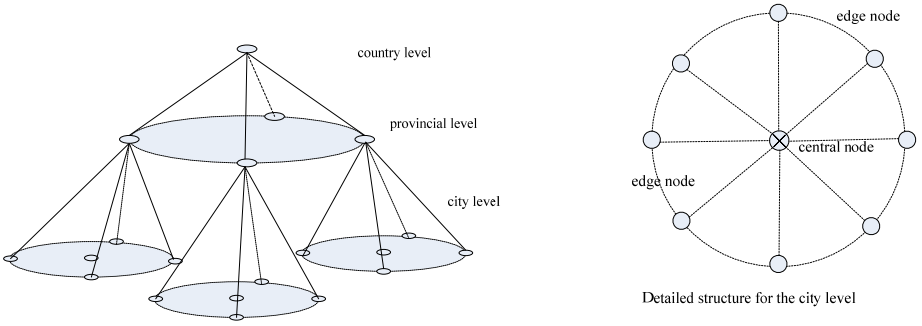


Figure 1 Hierarchical structure of the reporting network.

As a digital social network, the components of the reporting network are introduced. We analyse the hierarchical structure of the network as shown figure 1.

Then the working principles of the network are discussed in detail; that is, after an earthquake, the earthquake bureau quickly collects the disaster information by interaction with the reporting network through a number of short messages, as shown in figure 2.

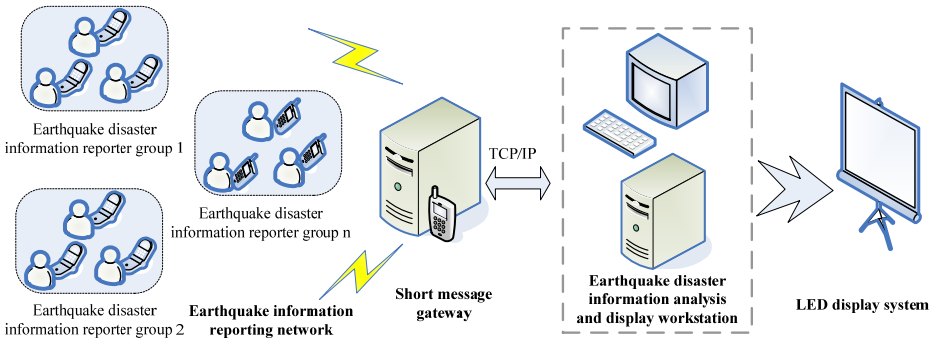
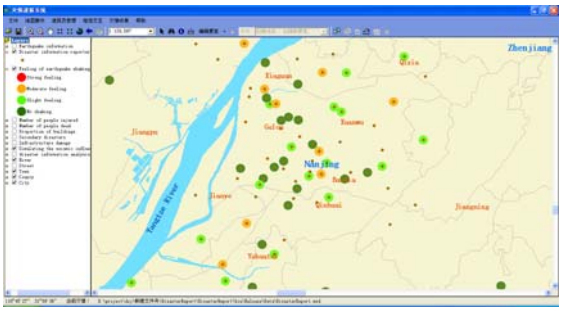
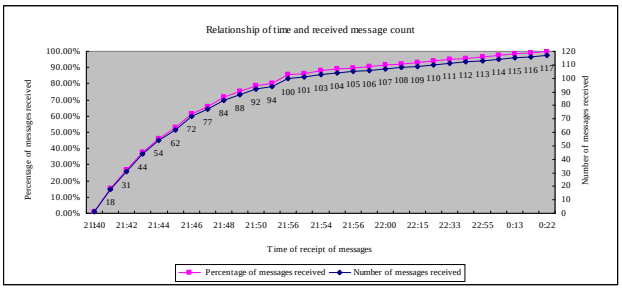
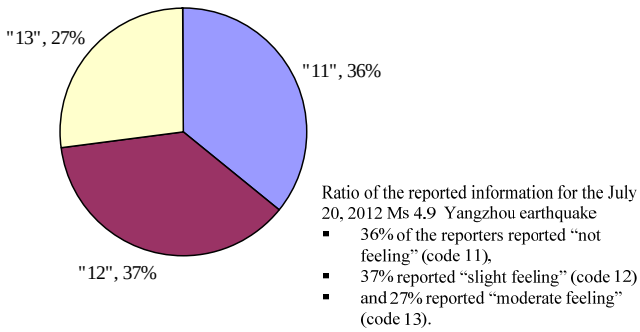


Figure 2 Working principle of the disaster information collection system

In order to effectively extract disaster information from the reported disaster messages, brief disaster information codes are designed. The group management principles of the disaster reporting network are described and the GIS modeling method of the network is discussed. Then the disaster information rapid reporting system is developed with the support of the reporting network. The system has been used to collect disaster information quickly in a real earthquake and some earthquake emergency drills and trainings. Now the system has become one of the core business systems among the daily duties of some city earthquake bureaus, such as Nanjing, Changzhou, Suzhou, and Shenyang.







Ratio of the reported information for the July 20, 2012 Ms 4.9 Yangzhou earthquake

- 36% of the reporters reported "not feeling" (code 11),
- 37% reported "slight feeling" (code 12)
- and 27% reported "moderate feeling" (code 13).

Figure 3 Application of the reporting network in a real earthquake