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Development of Disaster Event Detection Reporting System by Using OLAP Technology in Social Networks

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ABSTRACT:
The implementation of a modern seismic network involves many different research and technological aspects related to the development of sophisticated data management and processing. The communication systems need to rapidly generate useful, robust, and secure alert notifications. Here we provide a general technical and seismological overview of ISNet's complex architecture and implementation.

Keywords: seismic, sophisticated, robust, seismological, ISNEet's(Irpinia Seismic Network)

INTRODUCTION:

The last strong earthquake that occurred in the southern Apennines, the Irpinia earthquake on 23 November 1980 (M 6.9), was characterized by a complex rupture mechanism that ruptured three different faults (Bernard and Zollo 1989). This earthquake was well studied, and the quantity of data available has allowed a very detailed definition of the geometry and mechanisms of faults activated during this seismic event (Westaway and Jackson 1987; Pantosti and Valensise 1990). Even more than 20 years after the main event, the seismotectonic environment that contains the fault system on which the 1980 earthquake occurred shows continued background seismic activity including moderate-sized events such as the 1996 (M 5.1), 1991 (M 5.1) and 1990 (M 5.4) events. Moreover, the locations of the micro earthquakes (taken from the database of the Istituto Nazionale di Geofisica e Vulcanologia, INGV) define an epicentral area with a geometry and extent surprisingly similar to that of the 1980 earthquake and its aftershocks (figure 1A). These simple observations suggest that it may be possible to study the preparation cycles of strong earthquakes on active faults by studying the micro seismicity between seismic events. With this in mind, a seismic network of large dynamic range was planned and is now in an advanced phase of completion in the southern Apennines. Called ISNet (Irpinia Seismic Network), it is equipped with sensors that can record high quality seismic signals from both small-magnitude and strong earthquakes, from which it will be possible to retrieve information about the rupture process and try to understand the scaling relationships between small and large events. Due to its high density, wide dynamic range, and advanced data-acquisition and data-transmission technologies, the network is being upgraded to become the core infrastructure of a prototype system for seismic early warning and rapid post-event ground-shaking evaluation in the Campania region, which has seismic hazard that ranks among the highest in Italy (Cintiet al.2004).

ISNet will be devoted to real-time estimation of earthquake location and magnitude and to measuring peak ground motion parameters so as to provide rapid ground-shaking maps for the whole of the Campania region. The information provided by ISNet during the first seconds of a potentially damaging seismic event can be used to activate several types of security measures, such as the shutdown of critical systems and lifelines

(Iervolino*et al.* 2006).The implementation of a modern seismic network involves many different research and technological aspects related to the development of sophisticated data management and processing. The communication systems need to rapidly generate useful, robust, and secure alert notifications. Here we provide a general technical and seismological overview of ISNet's complex architecture and implementation.

RELATED OWRK

1. The Irpinia (Italy) 1980 Earthquake: Detailed Analysis of a Complex Normal Fault.

Authors: Bernard, P., and A. Zollo

A detailed analysis of near-source strong motion and leveling data, together with the results of teleseismic waveform modeling by Westawayand Jackson (1987) and aftershock studies by Deschamps and King (1984), allows a satisfactory kinematic description of the complex normal faulting associated with the magnitude *Ms* = 6.9, November 23,1980, Irpinia earthquake (southern Italy). The three main rupture episodes, starting at about 0, 20 and 40 s, are here associated with better constrained source parameters than in previous studies. We first evaluated the triggering time for the 11 closest accelerometers by using the well-recorded 40-s strong motion phases. This gave the absolute time and location of the dominant episodes of faulting. The first rupture propagated mainly toward the northwest on a NE dipping normal fault, at a mean velocity close to 3 km/s for about 20 km, and continued 15 km further on smaller sub faults. It was associated with surface breakage in the southeastern part. The second rupture started from the southeastern end of the first rupture, about 18 s after it, and propagated about 20 km toward the southeast on a low-angle normal fault dipping 20°NE. It was associated with secondary faulting on steeper planes reaching the surface. The third and last episode at 39 s nucleated near the first hypocenter, at shallower depth, and the rupture possibly propagated on a 10- to 15-km-long normal fault, striking SE, antithetic to the first activated fault. A clear correlation appears between the strength of the geological formations and the existence of surface breakage and shallow aftershock activity.

2. Semantic Analysis of Tweets

To detect a target event from Twitter, we search from Twitter and find useful tweets. Our method of acquiring useful tweets for target event detection is portrayed in Fig Tweets might include mention of the target event. For example, users might make tweets such as "Earthquake!" or "Now it is shaking." Consequently, earthquake or shaking might be keywords (which we call query words). However, users might also make tweets such as "I am attending an Earthquake Conference." or "Someone is shaking hands with my boss." Moreover, even if a tweet is referring to the target event, it might not be appropriate as an event report. For instance, a user makes tweets such as "The earthquake yesterday was scary." or "Three earthquakes in four days. Japan scares me." These tweets are truly descriptions of the target event, but they are not real-time reports of the events.

Therefore, it is necessary to clarify that a tweet is truly referring to an actual contemporaneous earthquake occurrence; this is denoted as a positive class. To classify a tweet as a positive class or a negative class, we use a support vector machine, which is widely used machine-learning algorithm. By preparing positive negative examples as a training set, we can produce a model to classify tweets automatically into positive and negative categories.

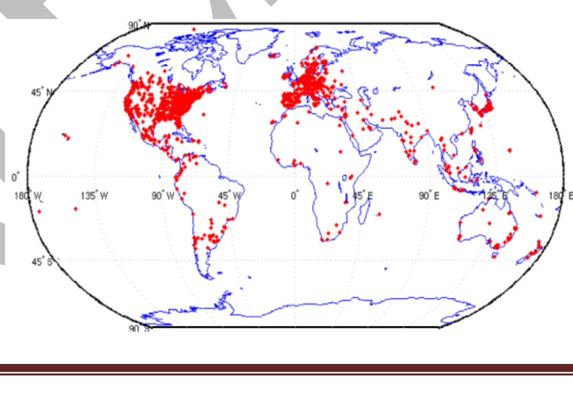

Fig1: Study of Earthquake in Italy.

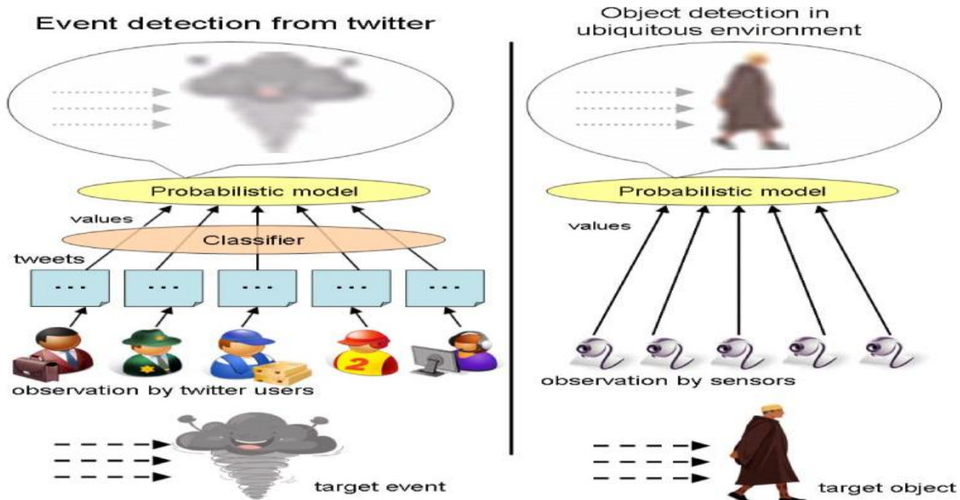

Fig2: Diagrammatic representation of event detection.

3. The Irpinia (Italy) 1980 Earthquake: Detailed Analysis Of A Complex Normal Fault.

A detailed analysis of near-source strong motion and leveling data, together with the results of teleseismic waveform modeling by Westaway and Jackson (1987) and aftershock studies by Deschamps and King (1984), allows a satisfactory kinematic description of the complex normal faulting associated with the magnitude *Ms* = 6.9, November 23,1980, Irpinia earthquake (southern Italy). The three main rupture episodes, starting at about 0, 20 and 40 s, are here associated with better constrained source parameters than in previous studies. We first evaluated the triggering time for the 11 closest accelerometers by using the well-recorded 40-s strong motion phases. This gave the absolute time and location of the dominant episodes of faulting. The first rupture propagated mainly toward the northwest on a NE dipping normal fault, at a mean velocity close to 3 km/s for about 20 km, and continued 15 km further on smaller sub faults. It was associated with surface breakage in the southeastern part. The second rupture started from the southeastern end of the first rupture, about 18 s after it, and propagated about 20 km toward the southeast on a low-angle normal fault dipping 20°NE. It was associated with secondary faulting on steeper planes reaching the surface. The third and last episode at 39 s nucleated near the first hypocenter, at shallower depth, and the rupture possibly propagated on a 10- to 15-km-long normal fault, striking SE, antithetic to the first activated fault. A clear correlation appears between the strength of the geological formations and the existence of surface breakage and shallow aftershock activity.

4. A Strong Motion Attenuation Relation for Early-Warning Application in the Campania Region (Southern Apennines).

For early-warning applications in particular, the reliability and efficiency of rapid scenario generation strongly depend on the availability of reliable strong ground-motion prediction tools. If shake maps are used to represent patterns of potential damage as a consequence of large earthquakes, attenuation relations are used as a tool for predicting peak ground-motion parameters and intensities. One of the limitations in the use of attenuation relations is that these have only rarely been retrieved from data collected in the same tectonic environment in which the prediction has to be performed. As a consequence, strong ground motion can result in underestimations or overestimations with respect to the recorded data. This also holds for Italy, and in particular for the Southern Apennines, due to limitations in the available databases, both in terms of distances and magnitude. Moreover, for “real-time” early-warning applications, it is important to have attenuation models for which the parameters can be easily upgraded when new data are collected, whether this has to be done during the earthquake rupture occurrence or in the post-event, when all the strong motion waveforms are available.

5. INVESTIGATIONS:

I choose earthquake in Campania region (southern Apennines) as target events, based on the preliminary investigations. I explain them in this section. First, we choose earthquakes s target events for the following reasons:

i. Seismic observations are conducted worldwide, which facilitates acquisition of earthquake information, which also makes it easy to validate the accuracy of our event detection methodology.
ii. It is quite meaningful and valuable to detect earthquakes in earthquake prone regions.

Second, I choose the southern Apennines constitute an active tectonic region of Italy as the target area based on the following investigation. I present a brief overview of Twitter in Italy: the twitter took more attention in Italy in 20th century so if I choose this my reporting system will reach to the people easily and effectively.

EXISTING SYSTEM:

In existing system an earthquake-reporting system using the event detection algorithm. Users can see the detection of past earthquakes. They can register their e-mails to receive notices of future earthquake detection reports. It alerts users and urges them to prepare for the imminent earthquake. It is hoped that a user receives the e-mail before the earthquake actually affects that area. We evaluate various conditions under which alarms might be sent to choose better parameters for our proposed system. We set alarm conditions as N_{tweet} positive tweets comes in 10 minute. We evaluate those methods by Precision ¼ $N_{earthquake,}N_{alarmsand}$ Recall ¼ $N_{earthquake}All_{earthquake}$ ($N_{earthquake}$: Number of earthquakes detected correctly, N_{alarms}: number of alarms, $All_{earthquake}$: number of all earthquakes that occurred).

PROPOSED SYSTEM:

The southern Apennines constitute an active tectonic region of Italy that accommodates the differential motions between the Adria and Tyrrhenian micro plates the source of almost all the seismicity in this region. Earthquakes originate in a narrow belt along the Apennine chain and are associated with young faults confined to the upper 20 km of the crust Along with more recent in situ stress data analysis analyses of seismological data for earthquake location, size, and mechanisms have shown that the southern Apennines are characterized by an extensional stress regime.

CONCLUSION

The communication systems need to rapidly generate useful, robust, and secure alert notifications. Here we provide a general technical and seismological overview of ISNet's complex architecture and implementation as described in this paper, we investigated the real-time nature of Twitter, devoting particular attention to event detection. Semantic analyses were applied to tweets to classify them into a positive and a negative class. Weregard each Twitter user as a sensor, and set the problem as detection of an event based on sensory observations.

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