Geocitsci.com: A citsci platform for geological hazards

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Geospatial technologies and data are multipurpose and valuable, that can initiate and contribute to different scientific researches. The rapid scientific and technological developments in this field lead to new research areas. In order to discuss the nature, quantity, quality, accuracy or infrastructure of geospatial data, they must be obtained first. To collect geospatial data, appropriate sensors and professional users are often in charge. However, with wide use of mobile devices with coordinate measurement capability (i.e. GNSS receivers), accessibility to freely available remote sensing data and maps, and web map applications, non-professionals are becoming more capable to collect and interpret geospatial data and thus contribute to this domain under various terms such as volunteered geographical information (VGI), participatory geographical information, etc.

Citizen science (CitSci) refers to the participation of individuals in scientific studies regardless of their research background. CitSci has important potential for geoscience researches that need massive and timely geospatial data. Considering the fact that almost every person can access Internet, online CitSci repositories where geospatial data are collected, analyzed and reported are good options for utilizing the potential of CitSci since they can provide platform independency for web and mobile apps with the sole requirement of data connection.

GeoCitSci is a freely accessible geospatial CitSci repository with a WebGIS interface and a mobile application (LaMA). The platform was initially developed to contribute the landslide researchers. The LaMA app and GeoCitSci helps volunteers to upload images and their observations on landslides, such as damages. The system can be adapted to different types of hazards, such as earthquakes. In addition to the mobile app, a web map interface that allows data upload is also implemented. A geodatabase running on the server complements the system by storing the collected data together with a landslide analysis mechanism from photos to ensure high quality content. Such a mechanism that checks the quality of the data provided by the participants is an indispensable part of CitSci repositories.

Since the nature of CitSci methods addresses the volunteers with different knowledge, experience and perspectives, a simple and responsive interface with highly understandable design that can be easily used by all participants is considered in the system implementation with an in-site navigation approach. The web map edit service is developed for those who do not have a
smartphone with location feature or have no Internet access. Images obtained from the participants have great importance in order to analyze the landslides. A deep learning architecture has been developed and integrated to the application, which automatically detects and classifies the images whether the image contains landslides or not. The developed deep learning architecture overcome controlling data quality problem which is very important in CitSci projects and eliminate the manual labor. The system is currently being adapted for earthquake researches for the purpose of disaster mitigation and management; and to flood mapping in order to support public safety and reduce the risks and losses.