

Development of System for Detecting Damages by Earthquake Projected on CCTV Camera Images

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1. Introduction

In the event of an earthquake, administrative organs concerned are required to grasp the situation of damage promptly. NILIM has been studying to support initial response in the event of an earthquake through detection of "changes" that may represent damage as differences by comparing images of CCTV (Closed Circuit Television) cameras installed at rivers, roads, etc. under the control of the Ministry of Land, Infrastructure, Transport and Tourism ("MLIT") at ordinary times with those immediately after occurrence of the earthquake. This study is developing a system (the "System") that periodically collects images of CCTV cameras selected for the test at ordinary times and automatically collects images of same cameras installed near the epicenter immediately after receiving the earthquake information announced by the Meteorological Agency when an earthquake occurs.

Many algorithms for detecting differences are proposed but none of them has accuracy of 100%. In order to remove noise (e.g., moving cars), it is necessary to obtain several images from the cameras monitoring at fixed points in a certain time interval and statistically process them. For the specific method, refer to the previous report 1).

This paper describes a trial experiment of the System using the Integrated Disaster Information Mapping System (DiMAPS) of the MLIT.

2. Trial test using DiMAPS

DiMAPS is a GIS that can collect disaster information from the site and display it on the map clearly. Fig. 1 shows a screen that could be displayed as a result of the communication test conducted on February 8, 2019 between the System and DiMAPS. To display images created by the System, select the layer of "Damage images" on the right of the screen and then a list of thumbnail images of CCTV cameras that detected a "difference" on the System is posted on the bottom of the screen. Enlarged images as shown in Fig. 2 are available by selecting "Detailed screen" of the CCTV camera image that needs to be checked in detail. The System has a function to color the field in

red where a "change" that may represent damage was detected. In the example of Fig. 2, open burning at a distant location was detected from the river monitoring camera.



Fig. 1: DiMAPS screen after the communication test



Fig. 2: Example of the image created by the System

3. Conclusion

We are going to increase CCTV cameras available in the System and grasp issues in practice.

See the following for details.

1) "Method of Grasping Disaster Situations Using CCTV Cameras --- Verification of the Optimal Number of Images for Noise Rejection in Detection of Areas Damaged by Earthquake in the Background Differencing Technique," JACIC Information No. 119, Japan Construction Information Center, Vol. 33, No. 2, pp.19-24, 2019.