The running photographic investigation by an automobile for estimating building damages of 2016 Kumamoto earthquakes

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It is crucial to develop methods for get a prompt overview of the damage situation soon after the earthquake, in terms of supporting decision-makings quickly. For this reason, we have been developing the Japan real-time information systems for earthquake (J-RISQ).
Both in cases of the foreshock (M6.5) on April 14 and the main shock (M7.3) on April 16, J-RISQ have published final reports of 2016 Kumamoto earthquakes which includes estimated distributions per 250-meter meshes of seismic intensities, exposed populations, and building damages, approximately within 10 minutes. These estimations indicate a belt of destructive area adjacent to Mashiki town, and also correspond approximately to actual damaged area. However, it still have several problems like estimated results of building damages were overestimated, and it have not been considerable for sequential shakings of aftershocks.
To verify and improve the real-time damage estimation methods, we have to gather information of the actual damage caused by 2016 Kumamoto earthquakes by multiple ways such as field investigations, aerial photographs, running investigations by automobiles.
In this paper, we are going to describe about the running photographic investigation by an automobile. We have performed running surveys from April 17th to 28th, in Kumamoto city, Nishihara village, Mifune town, Kashima town, Mashiki town, and Kousa town. The total running distances are 576 km.
We have acquired digital images every 5 meters with 6 cameras installed inside the automobile, additionally, the location and time of these cameras are synchronized with GPS. Then, we have extracted the 7,584 photographs of buildings from 571,700 photos. In the next place, we have chosen 593 total collapsed buildings by the standard of classification chart of the building damage released by Cabinet Office.
As a result, the distribution of total collapsed buildings are within the rage of 1 km around surface ruptures caused by 2016 Kumamoto earthquakes. These distribution is also coordinate with the damage concentrate area estimated by field investigations and aerial photographs.
From now on, we are going to develop methods for estimating building damages by way of the machine learning with extracted damage photographs. These methods would be actualize more detail and immediate damage estimation.
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