

Extraction of Disaster Area from Satellite Image by combining Machine Learning and Image Processing Technology

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In recent years, heavy rain which frequently occurs in various parts of Japan causes severe damages. It is important to identify the damaged area for disaster recovery and reconstruction.

To identify the damaged areas, a number of research have been conducted using satellite images. However, most the research has used the synthetic aperture radar (SAR) which is complicated to process, and the research using the optical satellite images has been limited to the preliminary level.

Therefore, in this study, we focus on the optical satellite images that are easy to process and interpret, and extract the damaged area by combining existing methods such as a land cover classification method by machine learning and an additive color mixing method.

With regard to the extraction of the damaged areas, it is necessary to extract the land cover changes. Therefore, we prepared the images before and after the disaster. First, we performed the land cover classification on the pre-disaster images and post-one. The results of the land cover classification showed that the land objects in the satellite images were properly classified. However, it was found that it was difficult to properly classify land objects below the resolution of satellite images (e.g., two-lane roads). Next, we applied an additive mixture method to extract the changes in land use before and after the disaster. As a result, it was found that the number of pixels indicating buildings decreased, while the number of pixels indicating fields increased in the damaged areas. It can be said that the area indicates the damaged area.

Based on the above results, it is possible to visually express the land cover changes before and after the disaster in a specific categories and to extract the damaged area.

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