

Applying Unmanned Aerial Vehicle on Agricultural Damage: A Case Study of the Meteorological Disaster on Taiwan Paddy Rice

Authors : Chiling Chen, Chiaoying Chou, Siyang Wu

Abstract : Taiwan locates at the west of Pacific Ocean and intersects between continental and marine climate. Typhoons frequently strike Taiwan and come with meteorological disasters, i.e., heavy flooding, landslides, loss of life and properties, etc. Global climate change brings more extremely meteorological disasters. So, develop techniques to improve disaster prevention and mitigation is needed, to improve rescue processes and rehabilitations is important as well. In this study, UAVs (Unmanned Aerial Vehicles) are applied to take instant images for improving the disaster investigation and rescue processes. Paddy rice fields in the central Taiwan are the study area. There have been attacked by heavy rain during the monsoon season in June 2016. UAV images provide the high ground resolution (3.5cm) with 3D Point Clouds to develop image discrimination techniques and digital surface model (DSM) on rice lodging. Firstly, image supervised classification with Maximum Likelihood Method (MLD) is used to delineate the area of rice lodging. Secondly, 3D point clouds generated by Pix4D Mapper are used to develop DSM for classifying the lodging levels of paddy rice. As results, discriminate accuracy of rice lodging is 85% by image supervised classification, and the classification accuracy of lodging level is 87% by DSM. Therefore, UAVs not only provide instant images of agricultural damage after the meteorological disaster, but the image discriminations on rice lodging also reach acceptable accuracy (>85%). In the future, technologies of UAVs and image discrimination will be applied to different crop fields. The results of image discrimination will be overlapped with administrative boundaries of paddy rice, to establish GIS-based assist system on agricultural damage discrimination. Therefore, the time and labor would be greatly reduced on damage detection and monitoring.

Keywords : Monsoon, supervised classification, Pix4D, 3D point clouds, discriminate accuracy

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