

## **Picture Pile: A citizen-powered tool for rapid post-disaster damage assessments**

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According to the World Bank's global risk analysis, around 34% of the total world's population lives in areas of high mortality risk from two or more natural hazards. Therefore, timely and innovative methods to rapidly assess damage to subsequently aid relief and recovery efforts are critical. In this field of post-disaster damage assessment, several crowdsourcing-based technological tools that engage citizens in carrying out various tasks, including data collection, satellite image analysis and online interactive mapping, have recently been developed. One such tool is Picture Pile, a cross-platform application that is designed as a generic and flexible tool for ingesting satellite imagery for rapid classification.

As part of the ESA's Crowd4Sat initiative led by Imperative Space, this study develops a workflow for employing Picture Pile for rapid post-disaster damage assessment. We outline how satellite image interpretation tasks within Picture Pile can be crowdsourced using the example of Hurricane Matthew, which affected large regions of Haiti in September 2016. The application provides simple microtasks, where the user is presented with satellite images and is asked a simple yes/no question. A "before" disaster satellite image is displayed next to an "after" disaster image and the user is asked to assess whether there is any visible, detectable damage. The question is formulated precisely to focus the user's attention on a particular aspect of the damage. The user-interface of Picture Pile is also built for users to rapidly classify the images by swiping to indicate their answer, thereby efficiently completing the microtask.

The proposed approach will not only help to increase citizen awareness of natural disasters, but also provide them with a unique opportunity to contribute directly to relief efforts. Furthermore, to gain confidence in the crowdsourced results, quality assurance methods were integrated during the testing phase of the application using image classifications from experts. The application has a built-in real-time quality assurance system to provide volunteers with feedback when their answer does not agree with that of an expert.

Picture Pile is intended to supplement existing approaches for post-disaster damage assessment and can be used by different networks of volunteers (e.g., the Humanitarian OpenStreetMap Team) to assess damage and create up-to-date maps of response to disaster events.