

Real-Time Automated SfM Monitoring for Landslides

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Landslides are a serious natural hazard that threaten the lives of many people worldwide. Monitoring and understanding them is crucial to managing their risk, to minimize their destructive capabilities, and to ensure the safety of people. This project tests a real-time, automated photogrammetry workflow on the Pont Bourquin landslide in Les Diablerets, Switzerland, in order to study it and analyze its change over time. Structure from Motion (SfM), Multi View Stereo (MVS) or photogrammetry, recreates a 3D model from 2D images, by capturing images of the same subject from different angles. Photogrammetry software often allows scripting of the workflow, so an automated process can be programmed. The method used has been originally developed for a rockfall scenario, so this project aims to answer the following research question: Can a real-time automated SfM monitoring technique be implemented to monitor a landslide and analyse its evolution through time? Three cameras are installed on the opposite side of the landslide's foot, and are programmed to take pictures every day. The pictures are transmitted to a server via mobile internet. The pictures are then organized, and the photogrammetric model is created. The model is then georeferenced, scaled, and registered using a reference model. Finally change over time is calculated. These processes will be automated. Coded targets have also been installed on the landslide to help the photogrammetric model creation. The method will also be tested and fine-tuned in the lab using small scale models. The results will be compared with other techniques such as LiDAR and digital image correlation.



Photo from one of the cameras showing the landslide. Some targets can be seen (white squares with black markings)