



Multilevel structure from motion application for flood damages assessment

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The identification and the assessment of damages occurred to flooded areas is a well-known critical task.

The use of remote sensing applications could be a solution, especially if the acquisition of images is contextual to the inundation or if it happens immediately after. The time of acquisition is important because the signs of the inundation are often transitory and they need to be collected as soon as possible. One of the most important element to be captured is the maximum water level.

This information is particularly essential in built-up areas, where the amount of damages is directly linked with the level reached by the water. The use of remote sensing in urban areas is critical because of nadir acquisition. This is not indicated for the identification of damages and water level often visible on the façade of buildings. The integration of terrestrial and aerial images of the involved areas may be a possible solution.

To obtain a quantitative approach, structure from motion algorithms can be used to acquire a 3D model of building facades (from terrestrial images dataset) and orthophotos from aerial images.

This approach has been applied to the areas near Turin (Piedmont region, NW ITALY) involved in the flood event occurred in December 2016. The water level reached in some places up to 1.5 meters causing significant damages. To obtain a detailed representation of the flooded area and the damages assessment three acquisitions have been performed using: i) RPAS ii) terrestrial camera iii) plane.

Integrating all of these sources of data allows: i) the identification of damages using ultra high resolution images over small areas (RPAS) ii) the identification of the water level on façades iii) a medium resolution orthophoto over a wider area to define flood event limit.

The presented application represents the first step of the development of a methodology that could be considered very useful for the evaluation of the water level reached during an inundation but also a possibility for the acquisition of an important dataset in areas involved in natural disasters.