WEB Open Drone Map (WebODM) a Software Open Source to Photogrammetry Process

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SUMMARY

In the photogrammetric process of the 3D reconstruction of an object or a building, multi-image orientation is one of the most important tasks that often include simultaneous camera calibration. The accuracy of image orientation and camera calibration significantly affects the quality and accuracy of all subsequent photogrammetric processes, such as determining the spatial coordinates of individual points or 3D modeling.

In the context of artificial vision, the full-field analysis procedure is used, which leads to the so-called Strcture from Motion (SfM), which includes the simultaneous determination of the camera's internal and external orientation parameters and the 3D model. The procedures were designed and developed by means of a photogrammetric system, but the greatest development and innovation of these procedures originated from the computer vision from the late 90s, together with the SfM method.

The reconstructions on this method have been useful for visualization purposes and not for photogrammetry and mapping. Thanks to advances in computer technology and computer performance, a large number of images can be automatically oriented in a coordinate system arbitrarily defined by different algorithms, often available in open source software (VisualSFM, Bundler, PMVS2, CMVS, etc. .) or in the form of Web services (Microsoft Photosynth, Autodesk 123D Catch, My3DScanner, etc.). However, it is important to obtain an assessment of the accuracy and reliability of these automated procedures.

This paper presents the results obtained from different photogrammetric surveys (close range and UAV) and processed with open source software using the Structure from Motion approach OpenDroneMap (ODM).

For the close range photogrammetric survey, we used the Canon EOS M3 digital camera (24.2 Megapixel, pixel size 3.72 mm). For the UAV survey we used the FlyNovex UAV by FlyTop S.p.A. It's a hexacopter with the camera Sony Alfa 6000 model with a resolution of 6000 pixel x 4000 pixel, a focal length of 16 mm, sensor size of 23.5 mm x 15.6 mm and a pixel size of 3.92 micron.

Photogrammetric surveys have also been processed with the Photoscan commercial software by Agisoft. The results were used as a reference to validate the point clouds coming from OpenDroneMap. The validation was done using the Cloud Compare open source software.