



## **A graphic user interface for efficient 3D photo-reconstruction based on free software**

Carlos Castillo (1,2), Michael James (3), and Jose A. Gómez (1)

(1) Institute for Sustainable Agriculture-CSIC, Agronomy, Córdoba, Spain (ccastillo@ias.csic.es), (2) University of Córdoba, Department of Rural Engineering, Córdoba, Spain., (3) Lancaster University, Lancaster, UK

Recently, different studies have stressed the applicability of 3D photo-reconstruction based on Structure from Motion algorithms in a wide range of geoscience applications. For the purpose of image photo-reconstruction, a number of commercial and freely available software packages have been developed (e.g. Agisoft Photoscan, VisualSFM). The workflow involves typically different stages such as image matching, sparse and dense photo-reconstruction, point cloud filtering and georeferencing. For approaches using open and free software, each of these stages usually require different applications.

In this communication, we present an easy-to-use graphic user interface (GUI) developed in Matlab<sup>®</sup> code as a tool for efficient 3D photo-reconstruction making use of powerful existing software: VisualSFM (Wu, 2015) for photo-reconstruction and CloudCompare (Girardeau-Montaut, 2015) for point cloud processing. The GUI performs as a manager of configurations and algorithms, taking advantage of the command line modes of existing software, which allows an intuitive and automated processing workflow for the geoscience user.

The GUI includes several additional features: a) a routine for significantly reducing the duration of the image matching operation, normally the most time consuming stage; b) graphical outputs for understanding the overall performance of the algorithm (e.g. camera connectivity, point cloud density); c) a number of useful options typically performed before and after the photo-reconstruction stage (e.g. removal of blurry images, image renaming, vegetation filtering); d) a manager of batch processing for the automated reconstruction of different image datasets.

In this study we explore the advantages of this new tool by testing its performance using imagery collected in several soil erosion applications.

### References

- Girardeau-Montaut, D. 2015. CloudCompare documentation accessed at <http://cloudcompare.org/>  
Wu, C. 2015. VisualSFM documentation access at <http://ccwu.me/vsfm/doc.html#>.