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ABSTRACT

Footprints can be captured in three-dimensions either by using an optical laser scanner or by the process of digital photogrammetry. Bennett et al. (2013) compared the respective merits of these two different methods of digital data capture in the context of the digital preservation of track sites. Whatever the method used to create a digital elevation model of a track the net result is usually a xyz file of coordinates. There are a number of commercial and freeware packages available to view such data but none specifically cater for the needs of those who study vertebrate tracks. As a result and to aid data processing a bespoke freeware package has been created and used extensively by the authors on a range of different footprint projects. The software can be downloaded from <http://footprints.bournemouth.ac.uk/> and is free to use by anyone engaged in education or research.

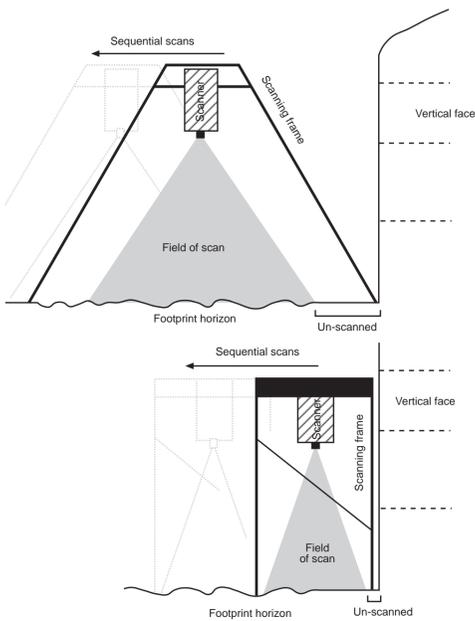
Bennett MR and Morse SA (2014). *Fossilised Locomotion: What can footprints tell us?* Springer.

Bennett, M. R., Falkingham, P., Morse, S. A., Bates, K., & Crompton, R. H. (2013). Preserving the impossible: conservation of soft-sediment hominin footprint sites and strategies for three-dimensional digital data capture. *PLoS one*, 8(4), e60755.

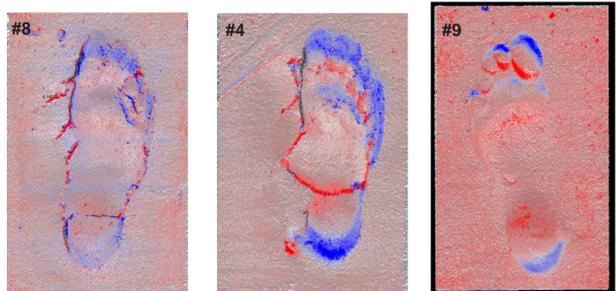
Data capture



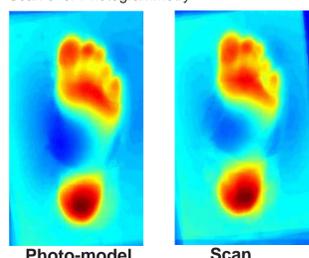
The photograph above shows an optical laser scanner being used in the field. The delicate scanner is being run from a small generator and is protected from excess sunlight and dust by a canvas covered custom made rig. The sketches below show various different designs of rig that have been used by the authors.



The alternative approach to capturing digital data at track sites is to use photogrammetry. This uses a series of oblique or sub-vertical digital photographs and triangulates xyz coordinates for individual pixels. Freeware development in this field has substantially increased the quality of data obtained via these methods and photogrammetry is easier to deploy in the field, set about comparing the data quality and model accuracy obtained by these different methods. Shown below are a series of images which are based on co-registered shells of the same footprint produced by the different methods. In most cases differences are limited to a fraction of a millimetre. The only issue with model produced by photogrammetry is the accuracy of the scaling required so that measurement taken from the models are absolutely accurate. Optical laser scanners give more accurate models when it comes to making very precise measurements although this can be overcome by good scaling protocols.

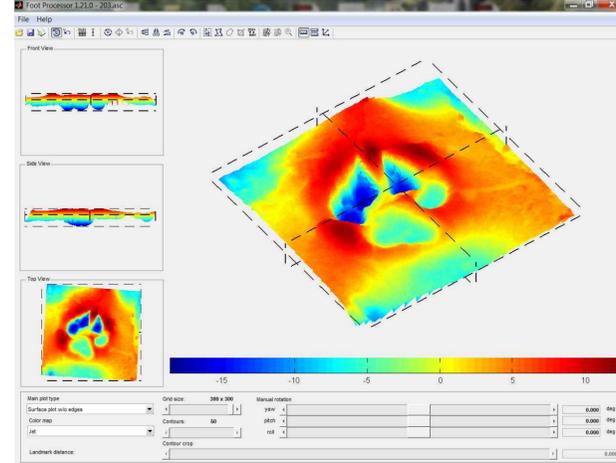


Positive variance Negative variance
 Scan over Photogrammetry

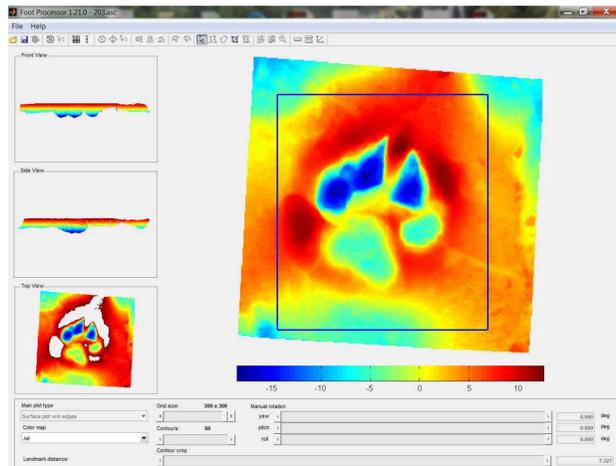


Here two means tracks have been computed for the same track-way using different methods. You can see that although the two different methods give very subtly different results they are nearly identical and for most purposes indistinguishable.

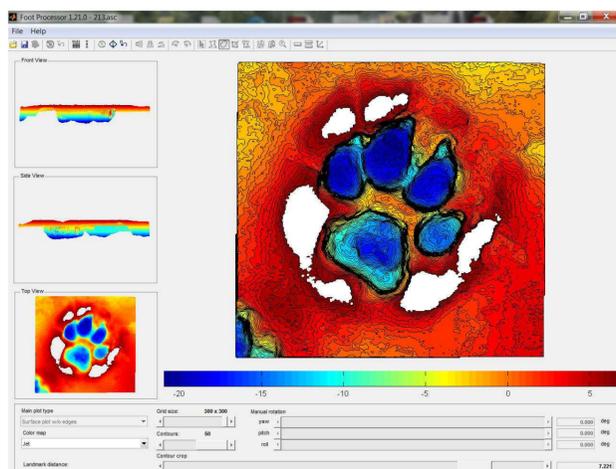
Basic functions



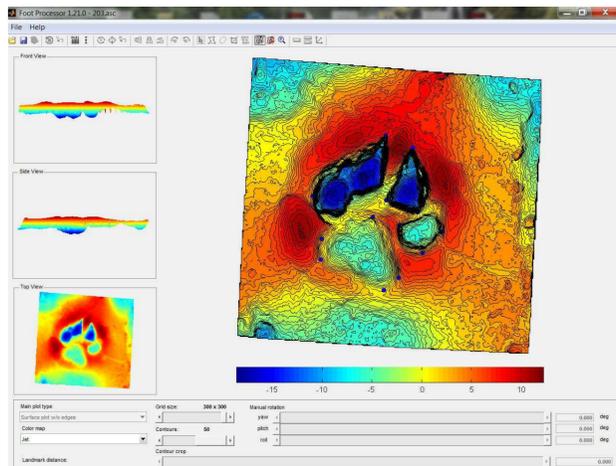
Isometric display



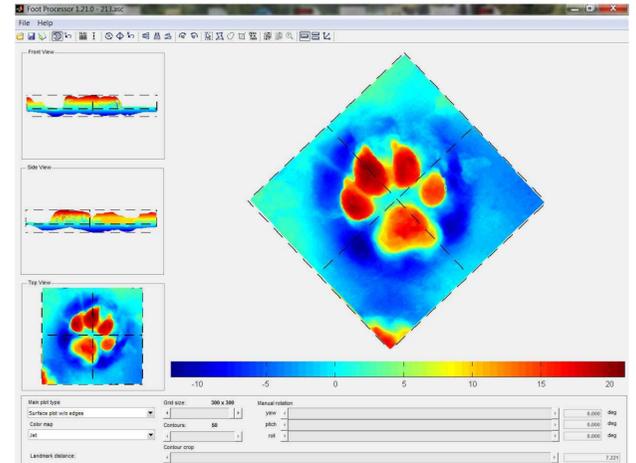
Simple crop functions



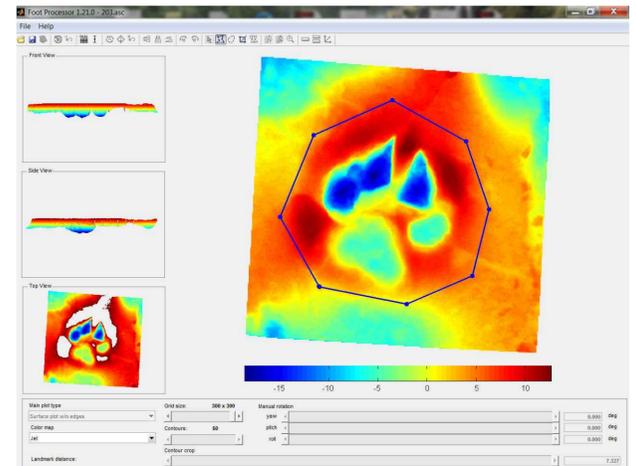
Crop by contour



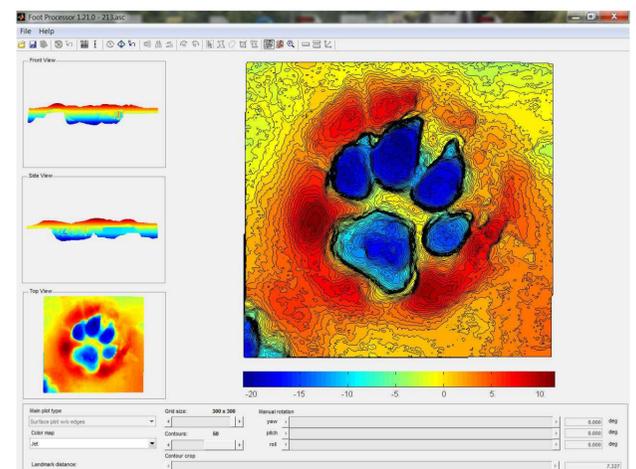
Place landmarks



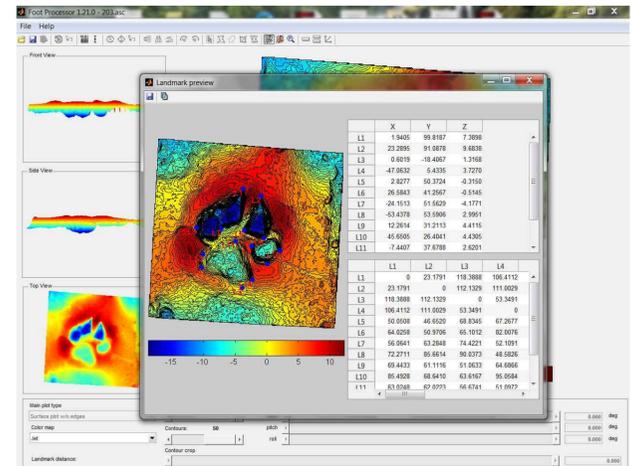
Inverted display



Advanced crop functions



Contour display



Export inter-landmark distances and coordinates