Fuels3D

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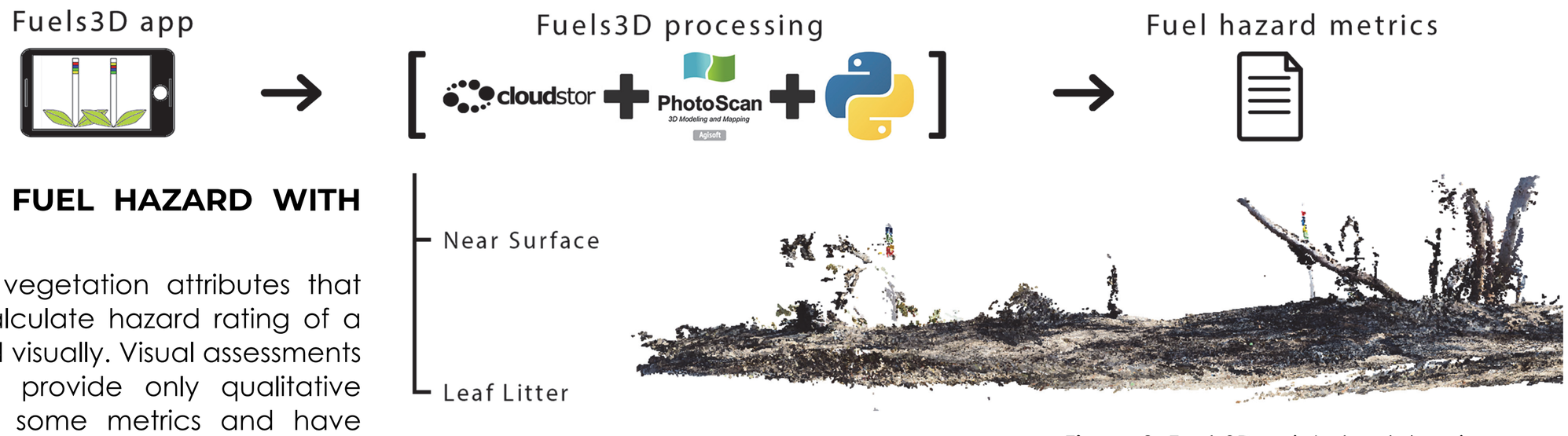
Fuels3D is a smart-phone app coupled with photogrammetry and computer vision techniques to produce 3D point clouds of the environment from which fuel hazard metrics are derived. Fuels3D supplements existing visual assessments with repeatable and quantitative estimates of surface and near-surface fuel. Trials are currently underway with end-user agencies across Victoria, South Australia and ACT.



ESTIMATING FUEL HAZARD WITH FUELS3D

Assessment of vegetation attributes that are used to calculate hazard rating of a plot is achieved visually. Visual assessments such as these provide only qualitative information on some metrics and have been demonstrated within the literature to be subjective, meaning assessments are often not repeatable.

The Fuels3D app (Figure 1) has been developed to provide a low cost, and repeatable method to collect fuel hazard information.

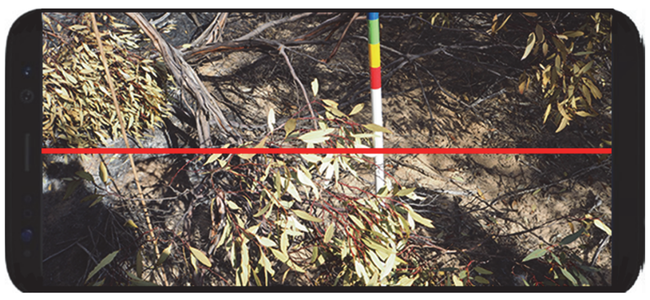


Figure 1. The Fuels3D app in action

Fuels3D utilizes images captured on a smartphone and computer vision algorithms to provide a 3D representation of the fuel structure. From the resultant point cloud, representation of structural metrics such as height and cover can be extracted for use in conjunction with the Overall Fuel Hazard Assessment Guide (OFHAG) in assessing the hazard present in a landscape.

KEY ADVANTAGES OF FUELS3D

- Minimal in-field requirements.
- Cheap and easy-to-use
- Repeatable and quantified metrics

SAMPLING WITH FUELS 3D

Fuels3D fuel hazard assessment is performed by photographing a sample transect using the Fuels3D smart phone application.

6 Fuels3D target markers are set up approximately 2m apart in a straight line creating a transect (Figure 2).

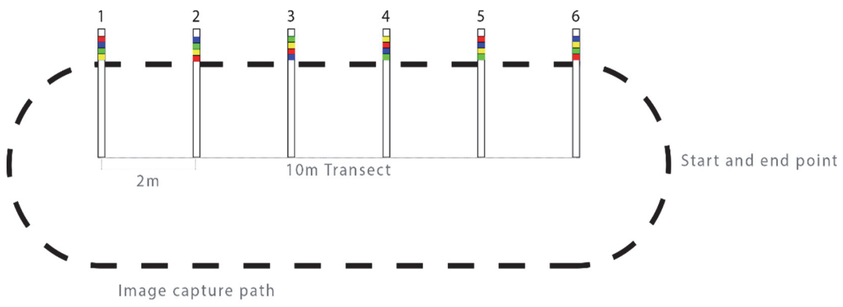


Figure 2. Fuels3D sample design

Sampling is performed by standing approximately 2m away from the transect and orienting the camera so that the image centre lies on the transect line at the base of the markers. An image is captured with each step as the user moves parallel to the transect line, following the image capture path shown in Figure 2. By raising and lowering the camera in a zig-zag motion, depth and structural information can be collected. Sampling continues until the user returns to the starting point.

Figure 3. Fuels3D point cloud showing near surface vegetation.

DATA PROCESSING

The upload solution for Fuels3D involves transferring the output from the smart phone to a Cloudstor account. The data is then processed using a combination of Agisoft PhotoScan and inhouse software to produce a 3D representation of the fuel conditions (Figure 3). This method allows vegetation attributes such as height, structure and proportion live/dead to be accurately measured and reported to the collector.

At CFA we are excited about the potential of the Fuels3D app. This research will allow us to quickly determine fuel hazard in a more objective and repeatable way, with a technology that is readily available to all of our members. RMIT have involved CFA throughout the project to ensure end user needs are incorporated to support future research utilisation.

- Rachel Bessell Acting Manager, Bushfire Research and Development. CFA HQ – Fire & Emergency Management.-

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