Project 1 Fuel Hazard Mapping

Project 2 Fire Surveillance

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Research Utilisation Forum (Sydney) / 2019
The Problem: Lack of repeatability and reliability with current field fuel hazard assessments.

Opportunity: To bring together off-the-shelf, consumer grade digital cameras with advances in computer vision and photogrammetric techniques.

Solution: A tool chain and suite of computer vision and photogrammetric algorithms that use images captured in the field to produce 3D point clouds from which fuel hazard metrics are calculated, and is adaptive to point clouds captured from other technologies.

### Criteria Table

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<thead>
<tr>
<th>Criteria</th>
<th>Visual Assessment</th>
<th>Fuels3D</th>
<th>TLS</th>
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</thead>
<tbody>
<tr>
<td>Easy to use (in-field)</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
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<tr>
<td>Cheap</td>
<td>yes</td>
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<td>Rapid</td>
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<td>Repeatable</td>
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<td>Accurate</td>
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<td>Quantitative</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
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<td>Integrates within existing fire and land management agency protocols and guides</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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</tbody>
</table>
Fuels3D

- Field image capture
- Image transfer
- Image matching and scale
- 3D point creation
- Fuel layer extraction
- Calculate fuel metrics and maps
- Data transfer of metrics
Fuels3D

Multi-agency utilisation testing and trials
Fuels3D

Utilisation with DELWP
Fuels3D

Utilisation with DELWP
Fuels3D+

Fuels3D

In-Field Image Collection (Terrestrial SFM)

Image Matching + Scale

Generation of Point Clouds

Data Collection and Generation of Point Clouds from other sources

Fuels3D+

Data Transfer of Inputs

Point Cloud Processing

Workflow dependent on 3D point cloud source.

Data Transfer of Outputs

- Classified point cloud into fuel layer image
- Spatial data layers of fuel layer height + cover
  - Table of fuel metric summaries
Fire Surveillance using Himawari-8

The Problem: Continuous and timely surveillance of active fire across the Australian continent; old algorithms applied to new data.

Opportunity: Launch of Himawari-8, providing 10 minute observations in near-real time.

Solution: A near-real time implementation of a robust and dynamic algorithm tailored for varying seasonal and geographical regions across Australia. (Significant improvements compared to WF-ABBA with false detections declining from 50% to less than 10%).
Fire Surveillance using Himawari-8

Utilisation with NSW RFS

- Himawari-8 image acquisition from BoM
- Multi-band + multi-temporal + regional training data
- Statistically determined clear-sky observations
- Statistical thresholding for fire activity
- Hotspots & Other Information