Fire Monitoring and Assessment Platform (FireMAP)

A More Responsive, Affordable and Safe Method for Mapping Wildland Fires.

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FireMAP Research Objective

Enable the acquisition, analysis and management of hyper-resolution unmanned aircraft systems (UAS) imagery for mapping post-fire burn severity in a more responsive, affordable and safe manner than is possible with current methods.
Geoanalytics – Spatial Resolution

Reynolds Creek Prescribed burn – 120m AGL – 6.4 cm/px
Geoanalytics - Spatial Resolution

Previous image resampled to 30 meter (Landsat) resolution
Training Data Selector
Geoanalytics - Discovery of Patterns -> Knowledge

Potential tools for measuring burn severity

• Machine Learning – learn by example

Support Vector Machine (SVM)

K-Nearest Neighbor (KNN)
Classifier - Reynolds Creek
Post-process Interpreted Image

Addition of high severity (consumption) from white ash classification with SVM
Alternate Applications
Alternate Applications
Spectroscopic Analysis

• Collecting vegetative and ash samples
• Looking for separability in terms of spectral reflectance
• Distinguishing classes of image objects related to fire severity
• Six classes: black ash, white ash, deciduous and conifer (canopy fuel), herbaceous and shrub (surface fuel)
Spectral Results

The graph shows the reflectance (%) of different vegetation types as a function of wavelength (nm). The graph includes data for Black Ash, White Ash, Conifer, Deciduous, Shrub, and Herbaceous plant types. The reflectance peaks and valleys at various wavelengths, indicating the unique spectral characteristics of each plant type.
Calculating Separability Using Two-Tailed T-tests

Using a significance level of 0.1

P values below significance level indicate spectral separability of classes
Sensor – Data Acquisition

• Inexpensive color cameras
  – Show Red, Green & Blue bands
  – Raspberry Pi 4-band multi-spectral camera
Future Work
Conclusion

• User Interface/ Training Data
• Object Identification
• Image Classification
• Post Processing / Data Output
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Any *Burning* Questions?