Source: Courtesy of The Bendigo Advertiser

Source: Courtesy of the National Emergency Response - Autumn 2014

Source: Courtesy of the 2009 Victorian Bushfires Royal Commission's Final Report
Bushfire Alert!
Branches on Powerlines

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After the Black Saturday Bushfires 2009

Powerline Bushfire Safety Program

Research on how fires can start from powerlines

Experiments in a container

Record the current (LF, HF) and voltage (LF, HF)
If a branch falls on a powerline, can we predict if it ignites or not?
Using half of phase 1 data, can we predict ignition?
Raw Data → Preprocessing → Feature Computation → Classification

Frequency features → Time series features
Features

Time series features using *tsfeatures* R package
- Spikiness, linearity, curvature, autocorrelation etc...
- 112 features

Frequency domain features
- Fast Fourier Transform
- Frequency bands
- Summary statistics of the amplitude of each band
- 128 features
Classification

Using a Randomforest model

10-fold cross validation

Using half of the Phase 1 data

<table>
<thead>
<tr>
<th>Tests</th>
<th>Mean CV Accuracy %</th>
</tr>
</thead>
<tbody>
<tr>
<td>All tests</td>
<td>83.3</td>
</tr>
<tr>
<td>Tests with phase 1 time &gt; 4s</td>
<td>86.1</td>
</tr>
<tr>
<td>Tests with phase 1 time &gt; 6s</td>
<td>85.6</td>
</tr>
<tr>
<td>Tests with phase 1 time &gt; 8s</td>
<td>87.0</td>
</tr>
</tbody>
</table>
Raw Data → Preprocessing → Feature Computation

Feature Computation → Cluster Features

Cluster Features → Find a subset of features

Find a subset of features → Classification
Feature selection

Reduce to 36 features

Accuracy of 82% using 10-fold CV and a randomforest model

Current related features were most telling

- Linearity of current
- Spikiness of current
- Curvature of current
- Maximum amplitude of the low frequency band of current
Summary

Predict ignition before it happens
Accepted at IEEE Transactions on Power Delivery
Thanks to ACEMS for Research Support Funding
@sevvandik
Thank you!


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