Source: Courtesy of the 2009 Victorian Bushfires Royal Commission's Final Report

Source: Courtesy of The Bendigo Advertiser

Source: Courtesy of the National Emergency Response - Autumn 2014

# 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

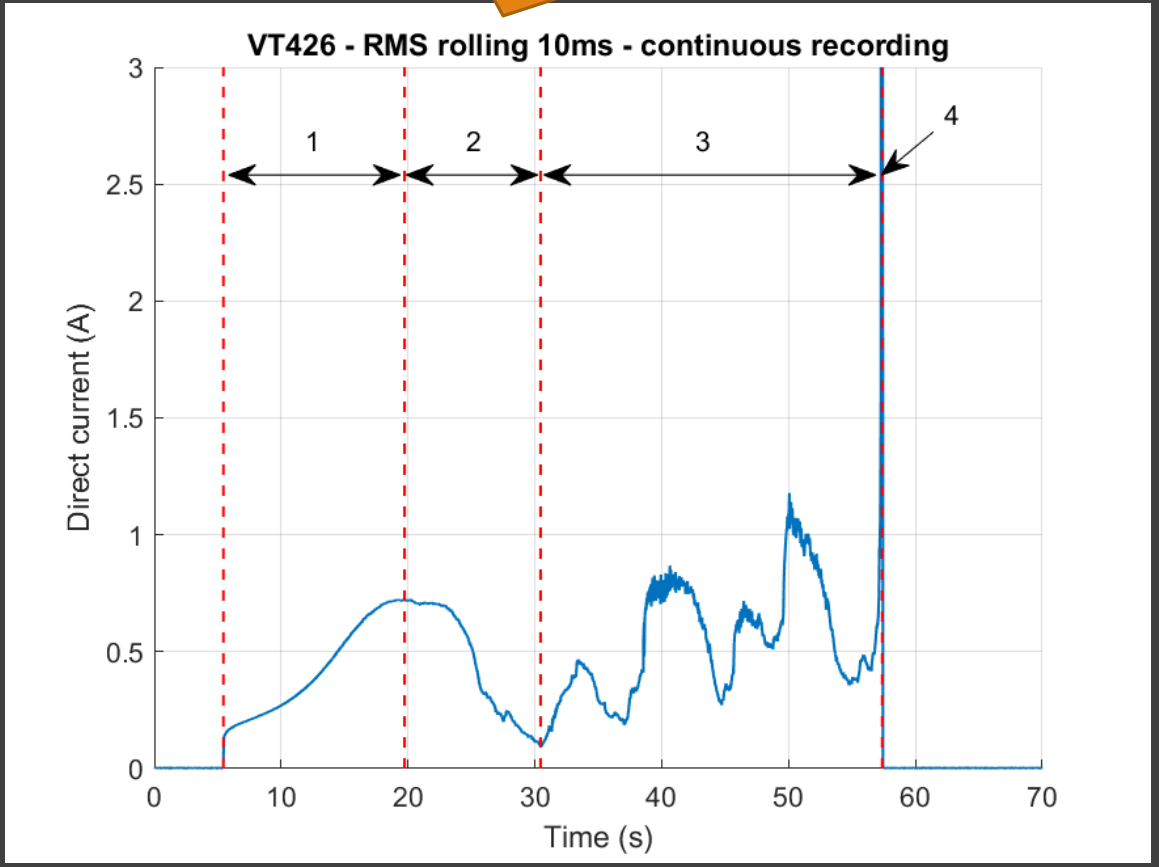
Record the current (LF, HF) and voltage (LF, HF)

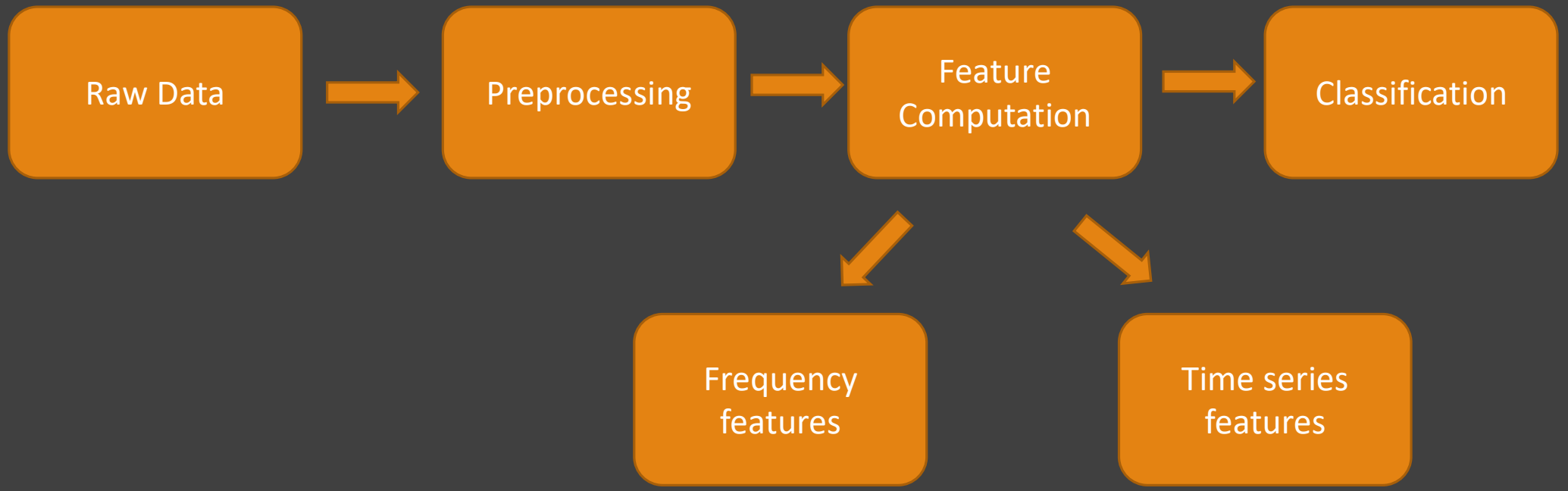
# If a branch falls on a powerline, can we predict if it ignites or not?

Raw Data → Preprocessing

Using half of phase 1 data, can we predict ignition?

Ignition after phase 1




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

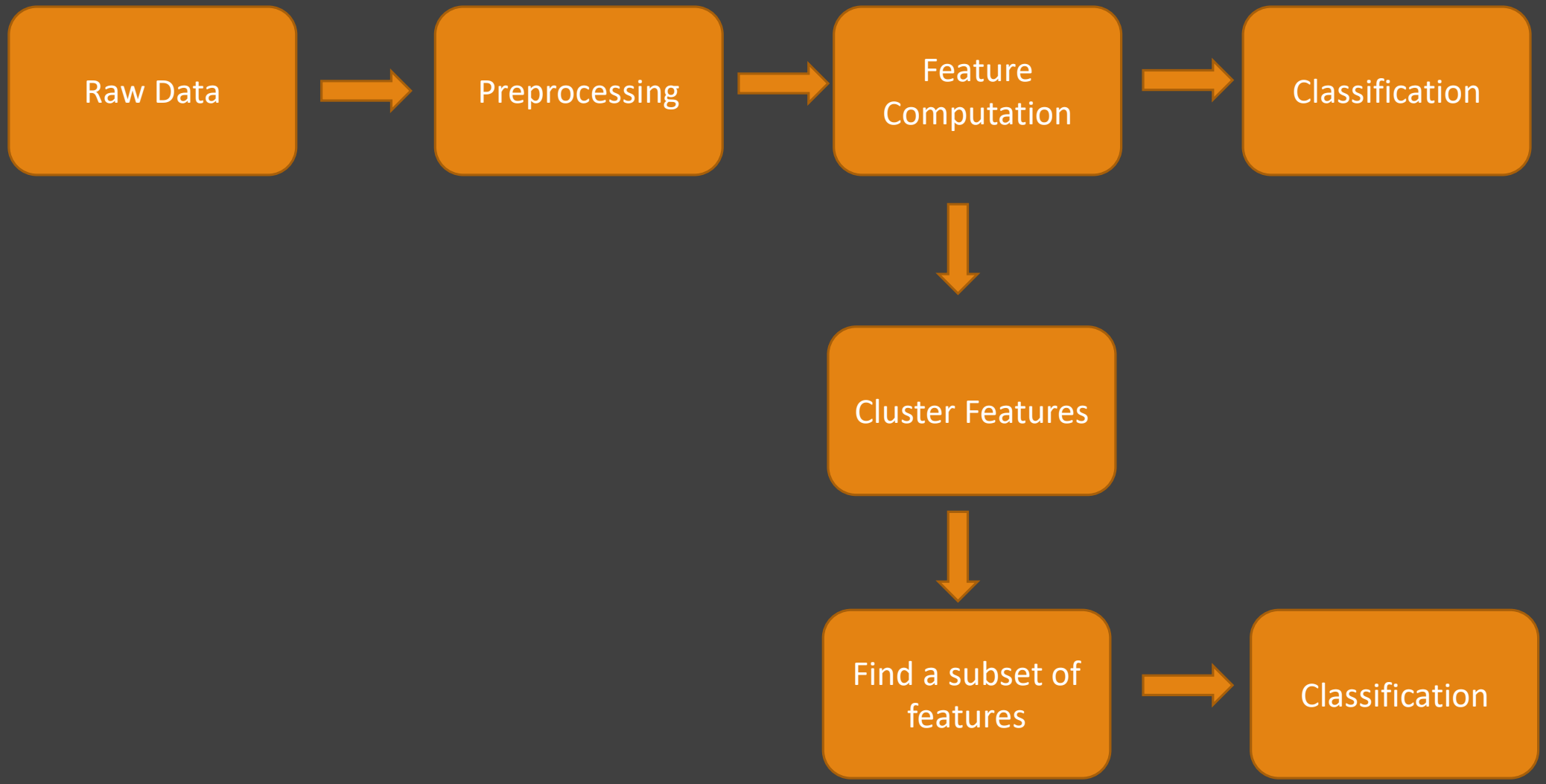
# Classification

Using a Randomforest model

10-fold cross validation

Using half of the Phase 1 data

| Tests | Mean CV Accuracy % |
|---|---|
| All tests | 83.3 |
| Tests with phase 1 time > 4s | 86.1 |
| Tests with phase 1 time > 6s | 85.6 |
| Tests with phase 1 time > 8s | 87.0 |


Raw Data
Preprocessing
Feature Computation
Classification
Cluster 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

http://bit.ly/vegignite

Accepted at IEEE Transactions on Power Delivery

Thanks to ACEMS for Research Support Funding

@sevvandik

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