US Wildfire Analysis

ECE 143 Fall 2020
Team 4:
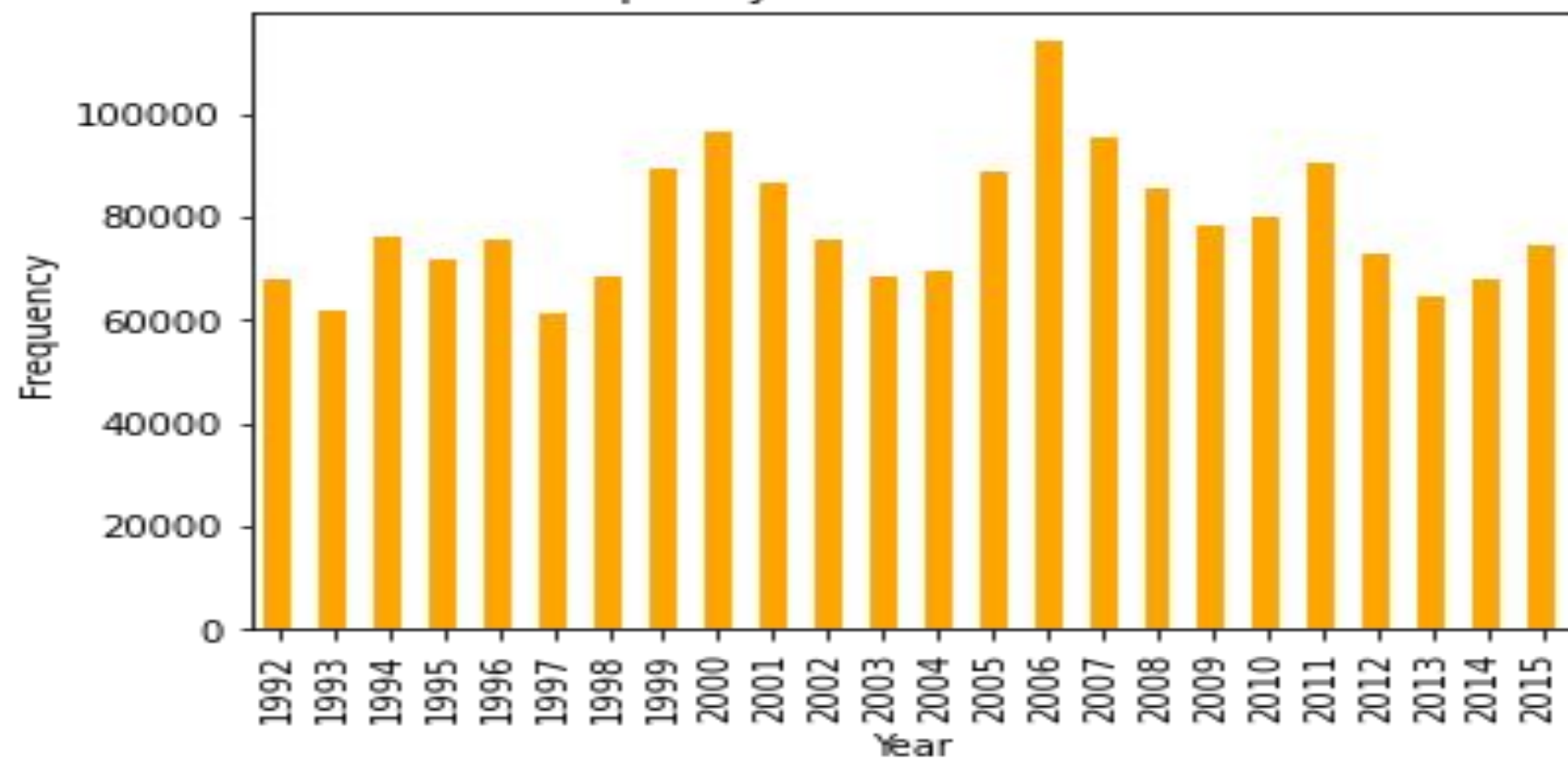Schuchen, Elakkia, Jack, Jessi
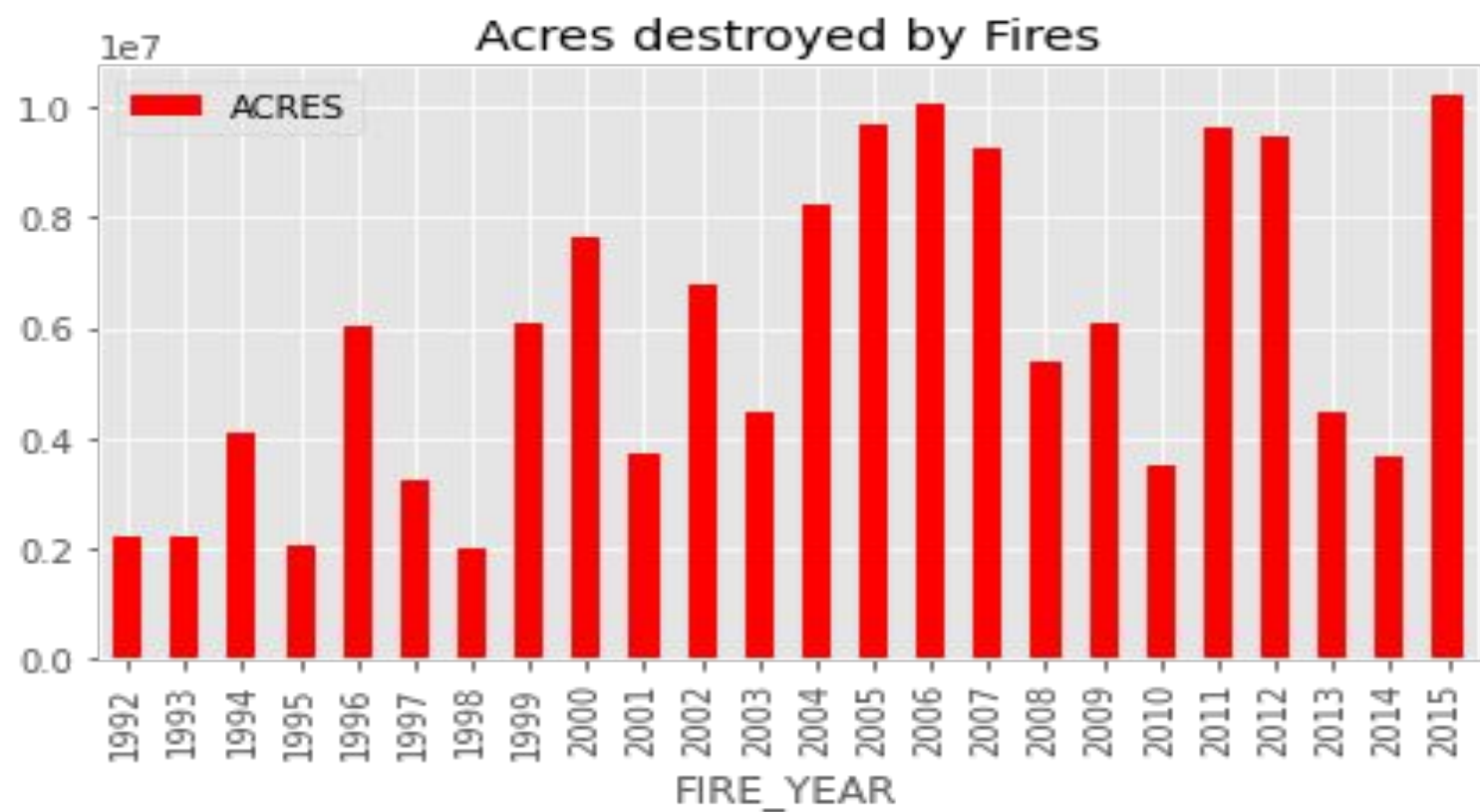
Overview

- Have the fires in the United States increased over time?
- Which states suffer most from forest fires?
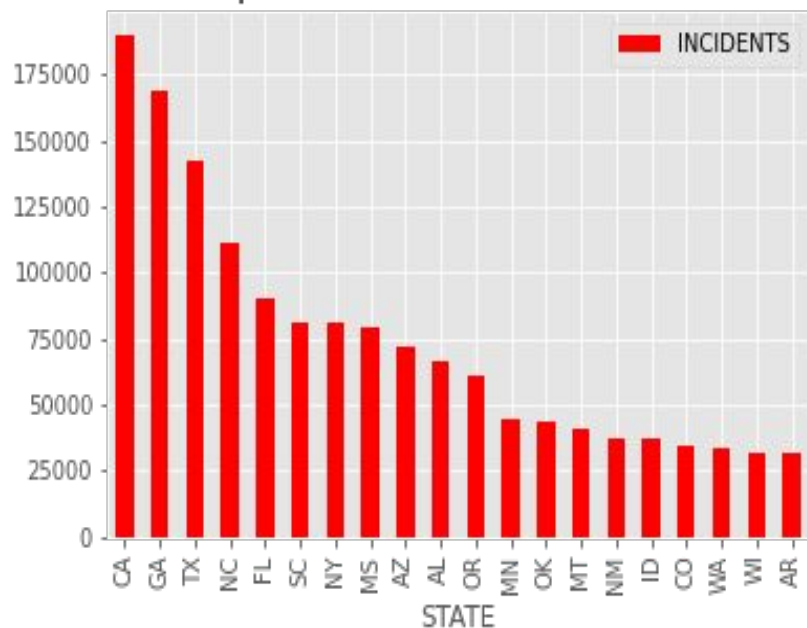- Causes of fires
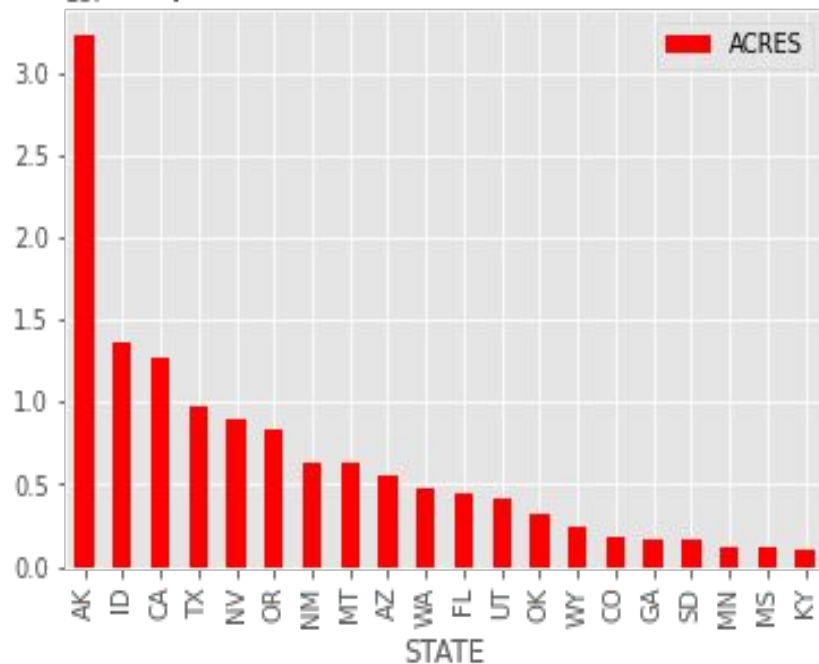
General Analysis

Frequency of Fires 1992 to 2015

Acres destroyed by Fires

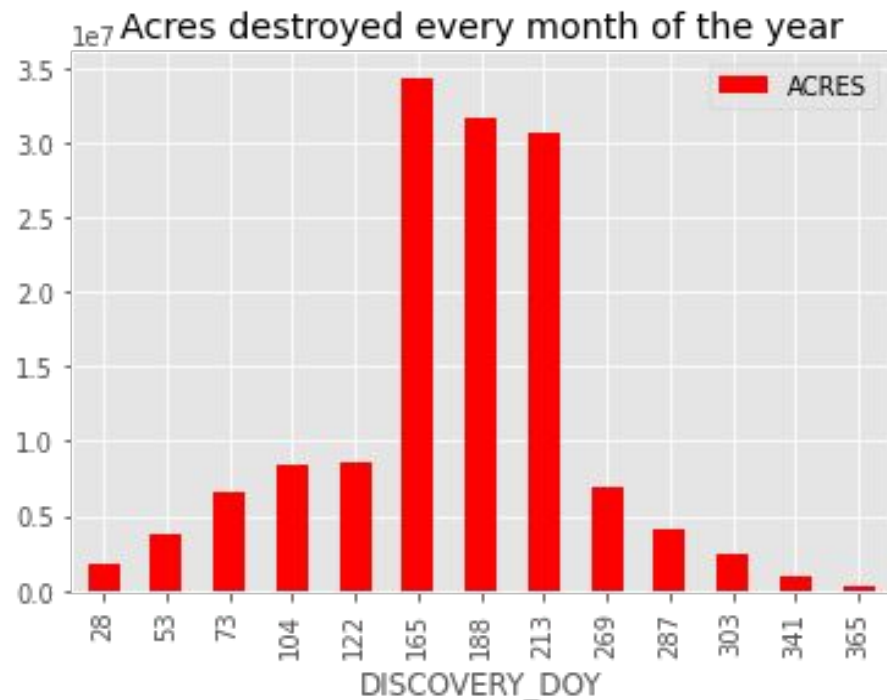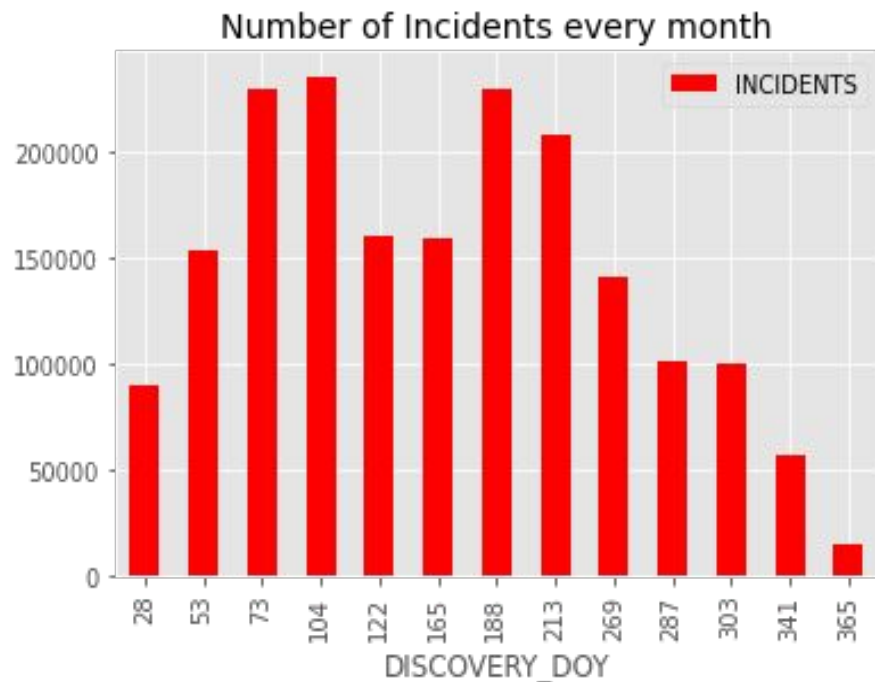# States - Size & Number of Incidents

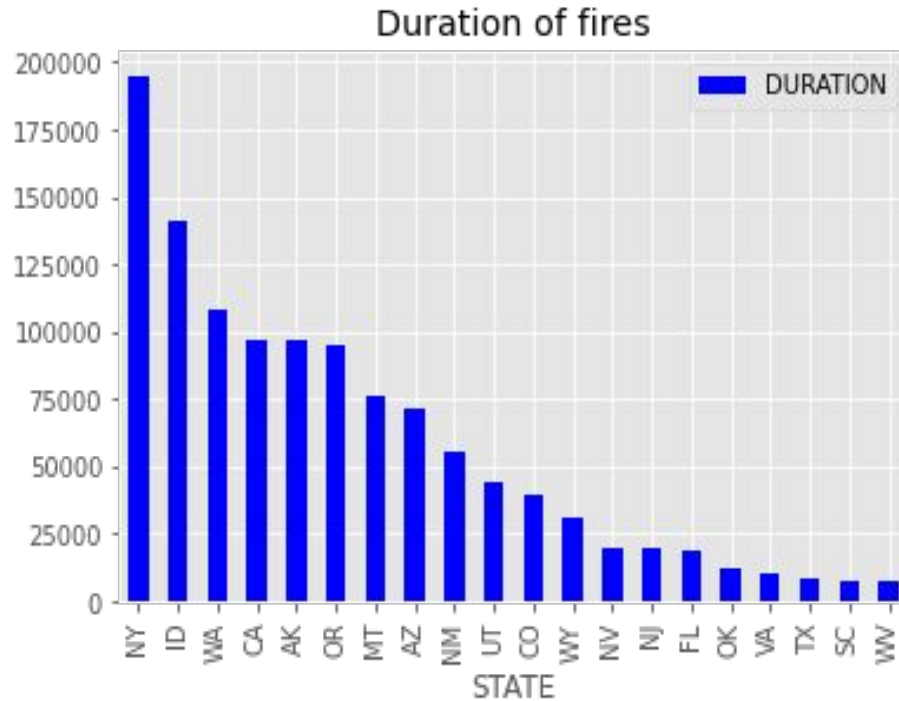# Heat Map of US wildfires

Average size of wildfires occurring from 1992 to 2015 (lighter color means bigger fire)
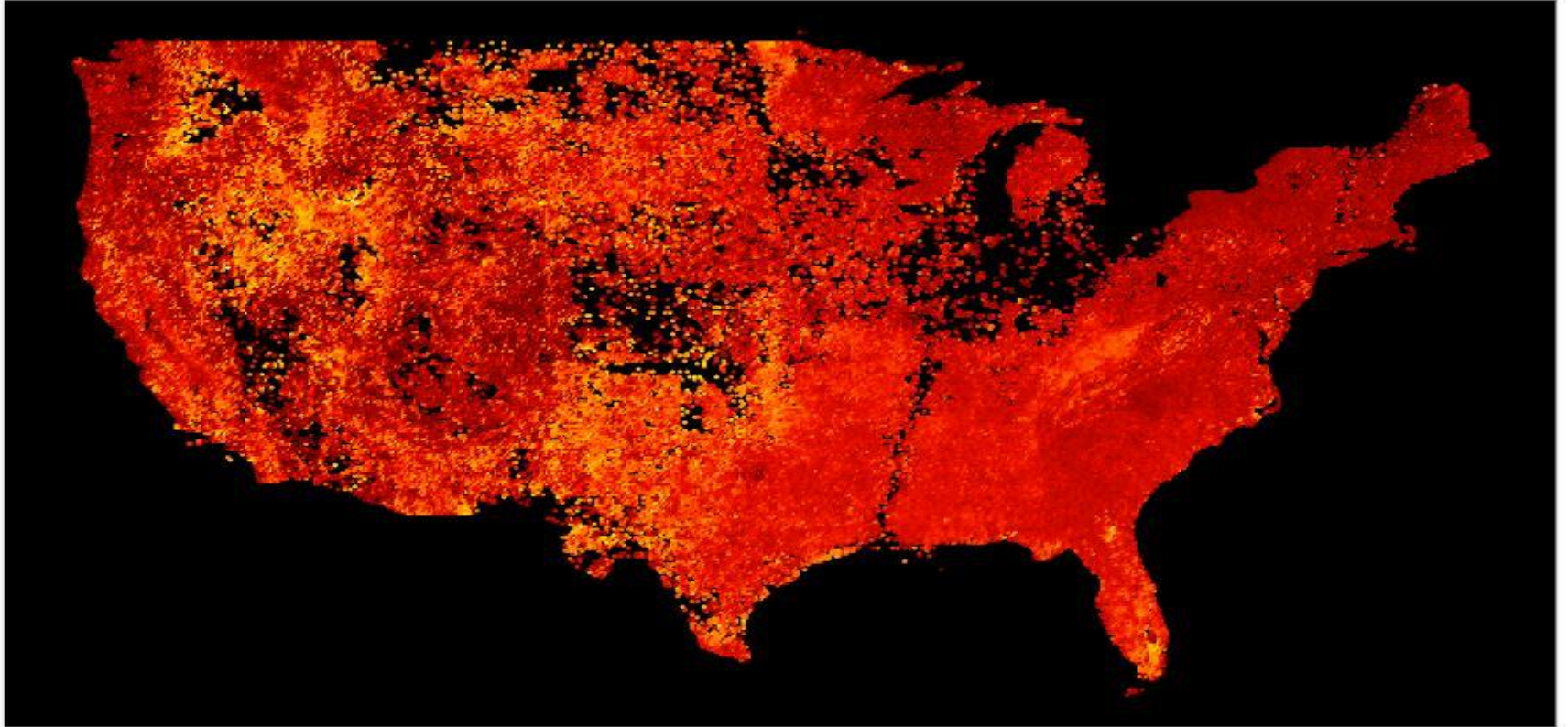
Does the season have an influence?
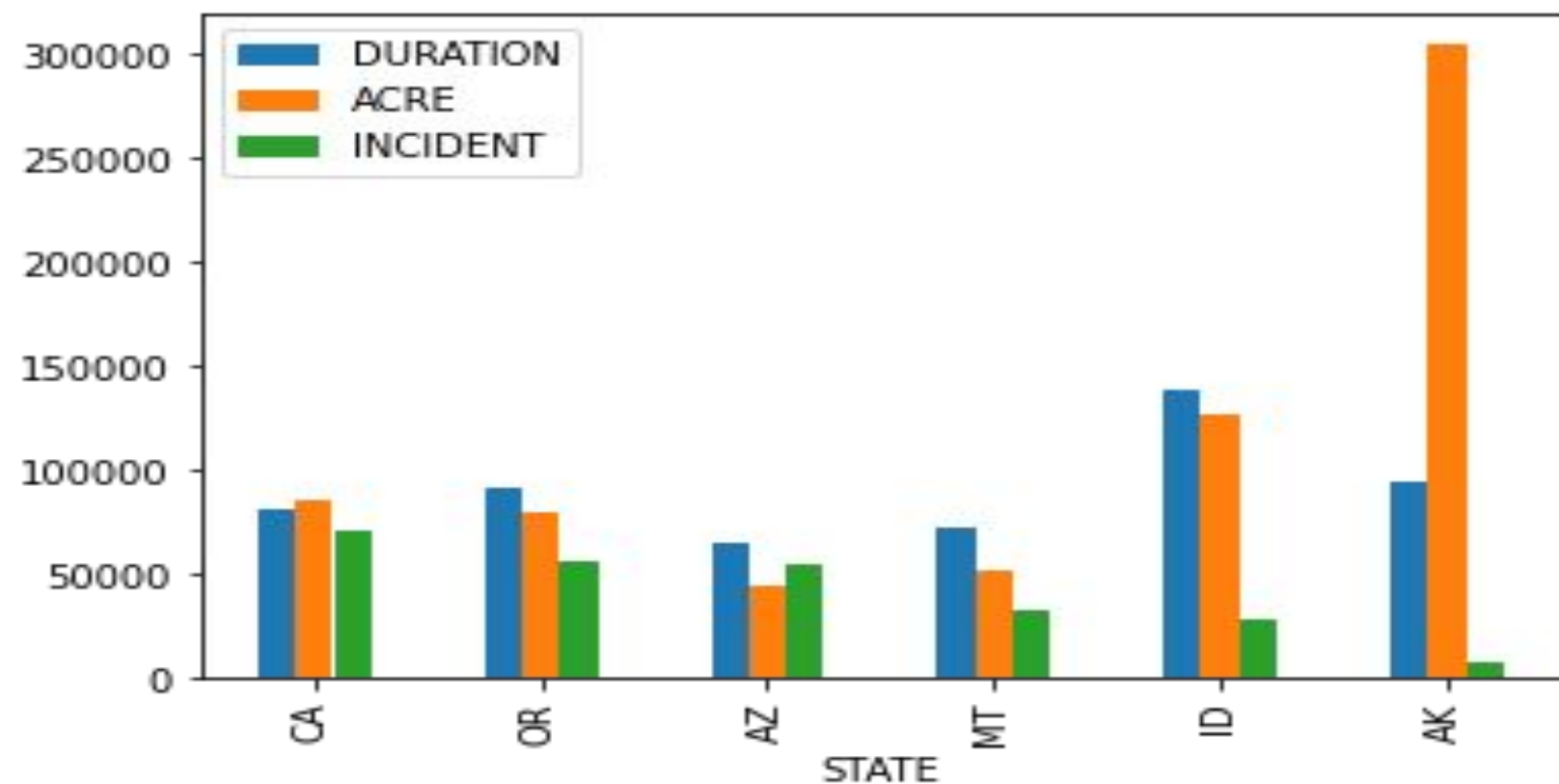

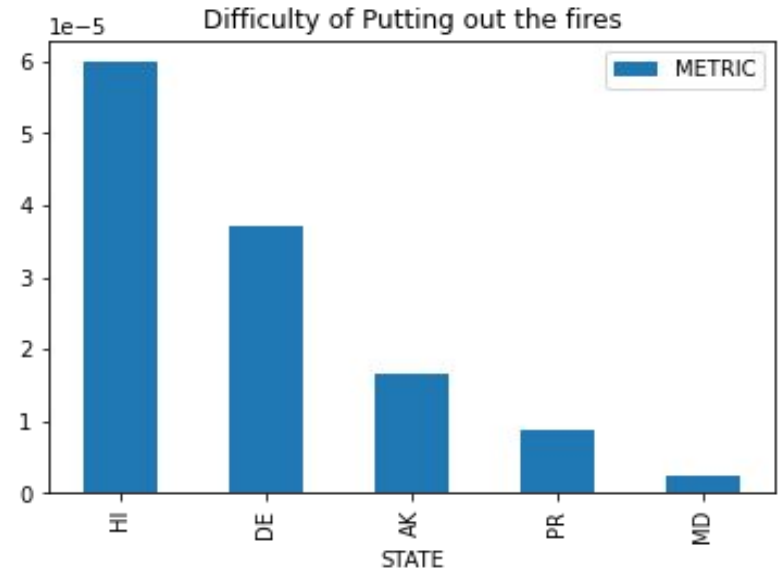Number of Incidents every month

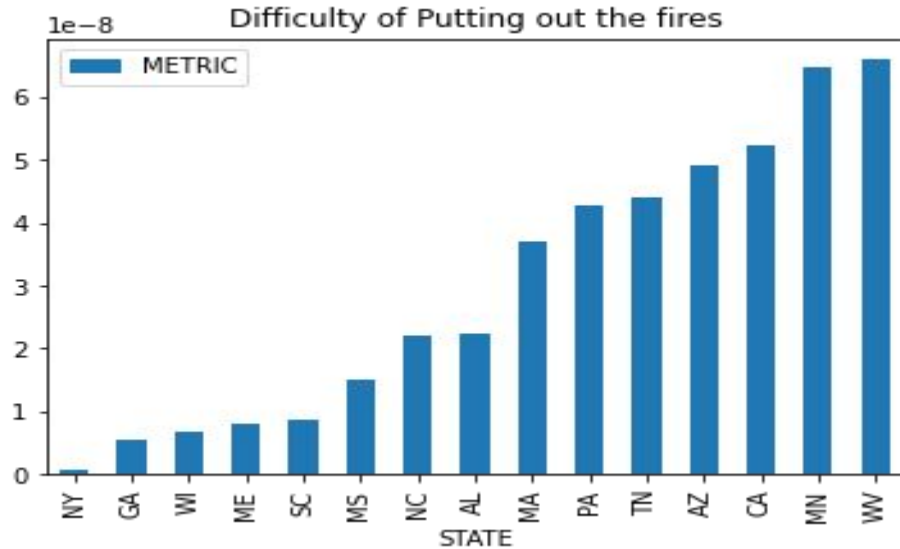Acres destroyed every month of the year

Duration of the fires

Duration of fires

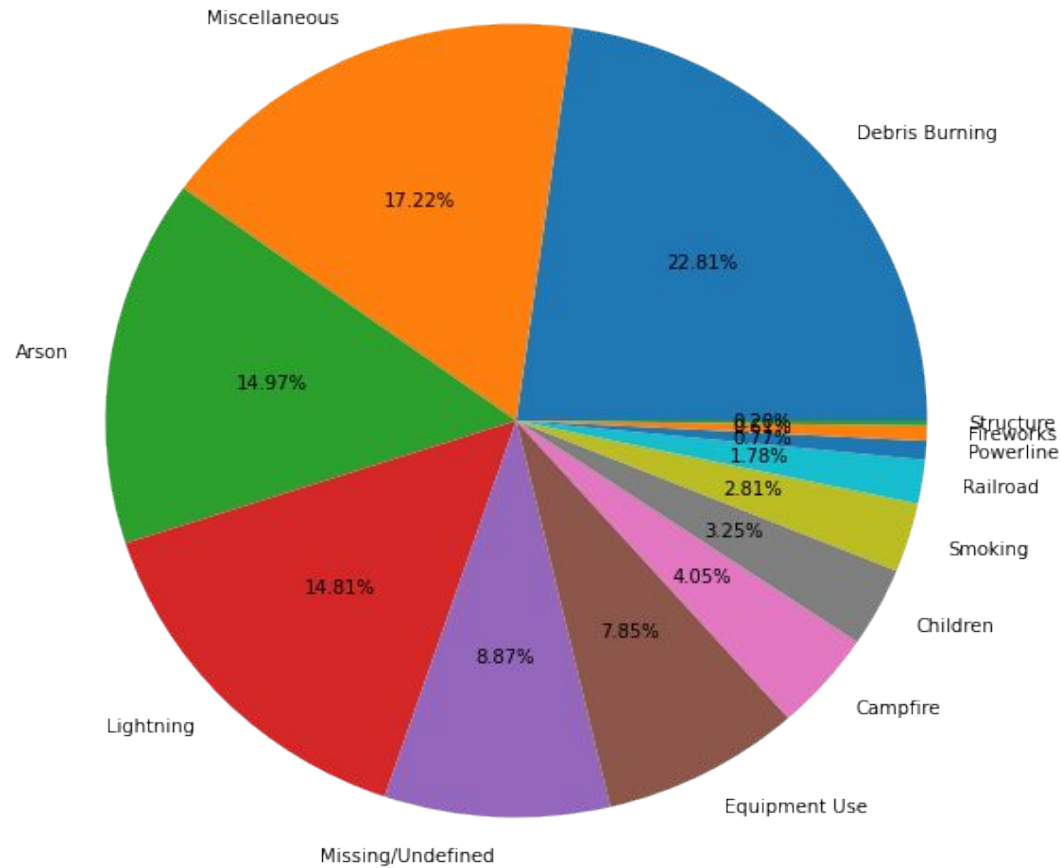Duration vs Area vs Incidents

Response metric of each state

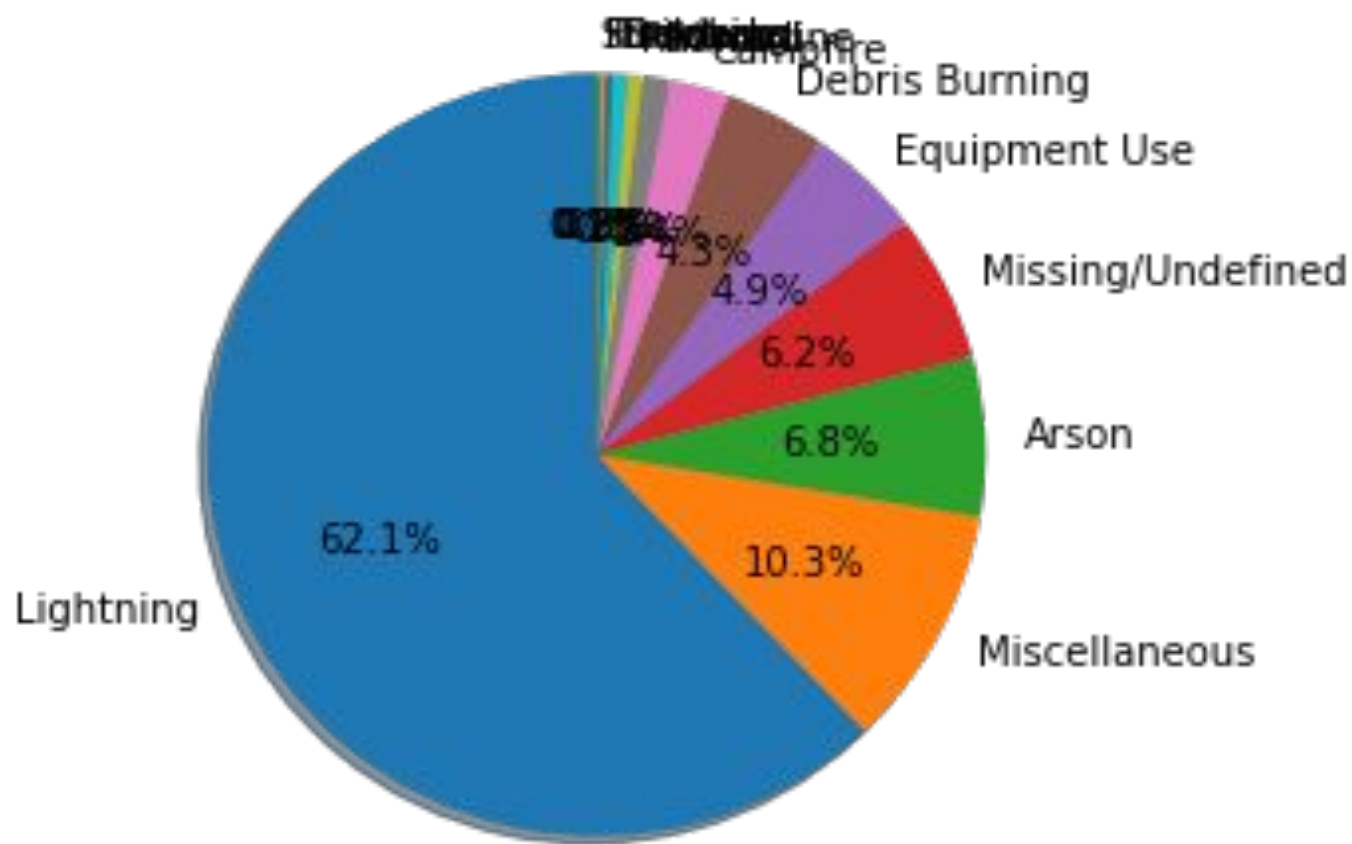Lower the value, worser the response

Fire Cause Distribution in US
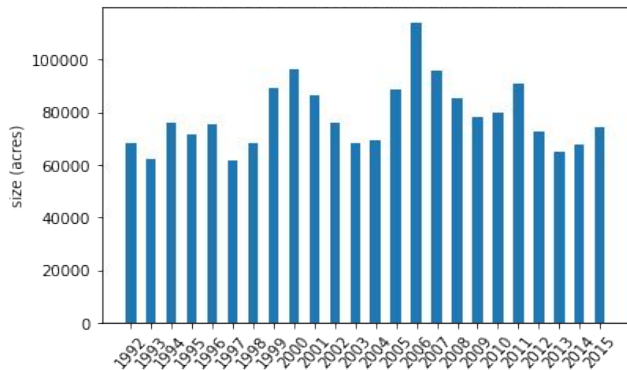
Fire Cause Distribution - Area

- Lightning — 62.1%
- Miscellaneous — 10.3%
- Arson — 6.8%
- Missing/Undefined — 6.2%
- Equipment Use — 4.9%
- Debris Burning — 4.3%
- Campfire

Case Studies - NY, CA, TX

Size - Year
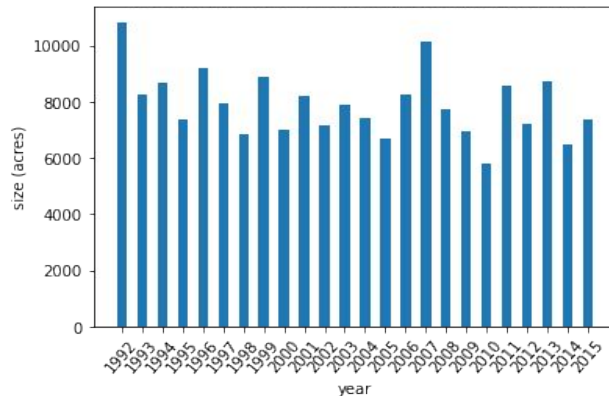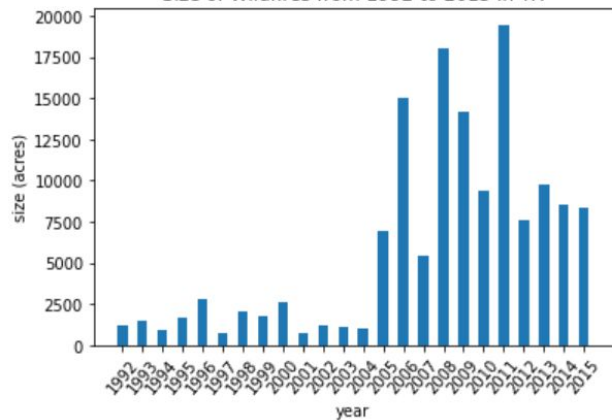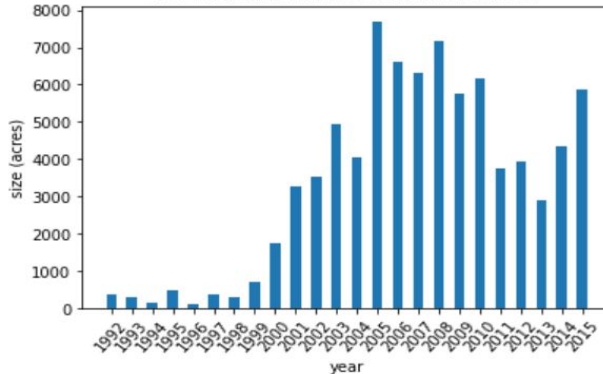
Relation between the Cause and the Fire Year

The relation between the cause and the fire year in California
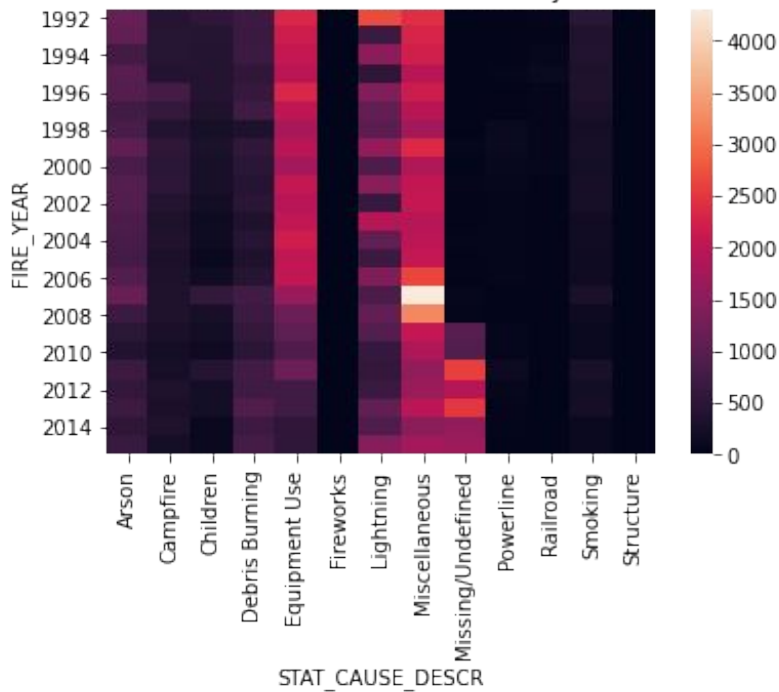
The relation between the cause and the fire year in US

Relation between the Cause and the Fire Year

The relation between the cause and the fire year in TX

The relation between the cause and the fire year in NY

Cause Prediction

Random Forest

- Consists of Decision Trees
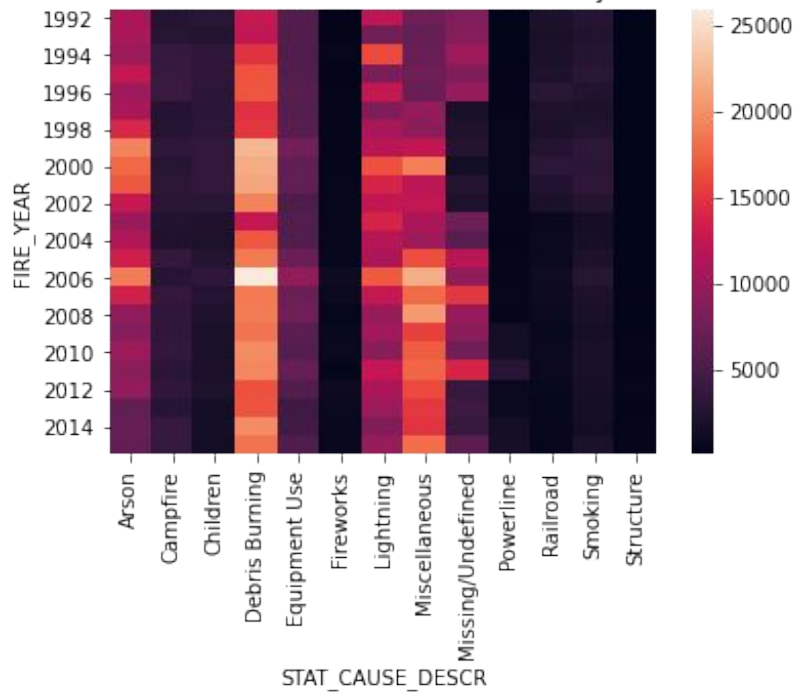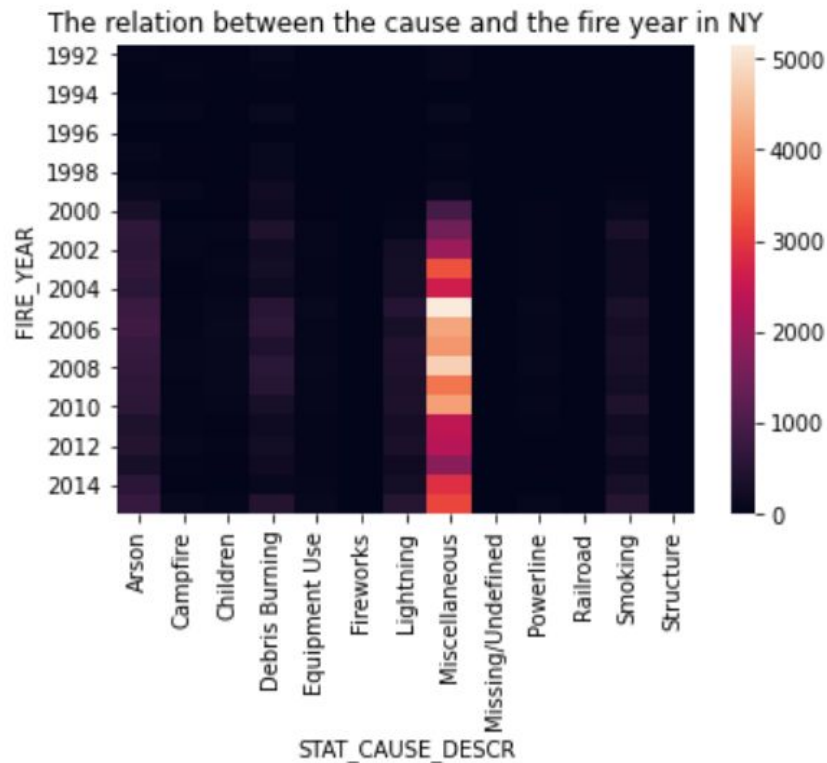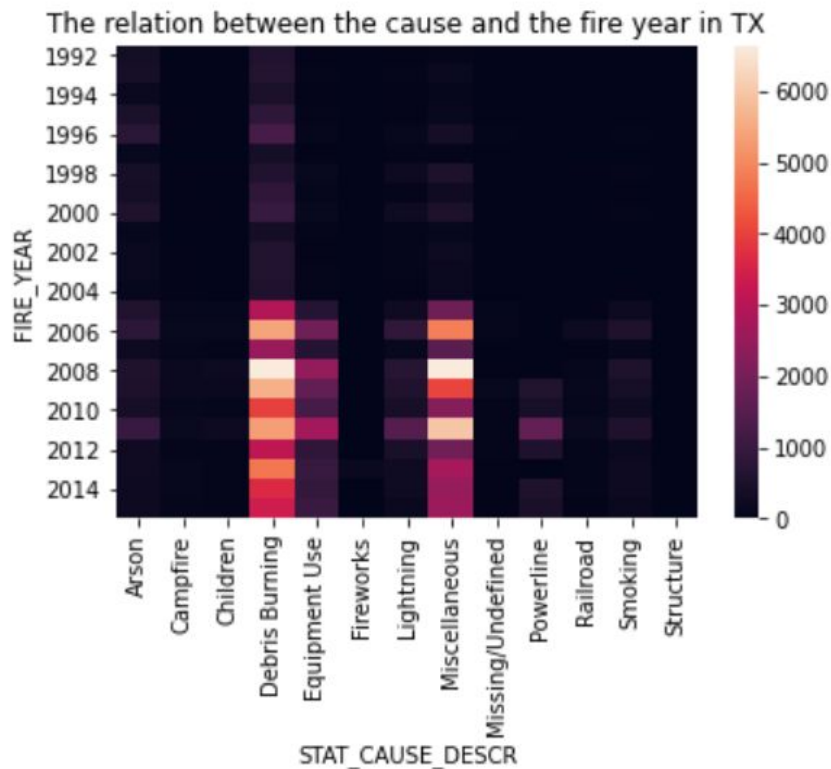- Takes majority voting to output final prediction.

Random Forest Simplified
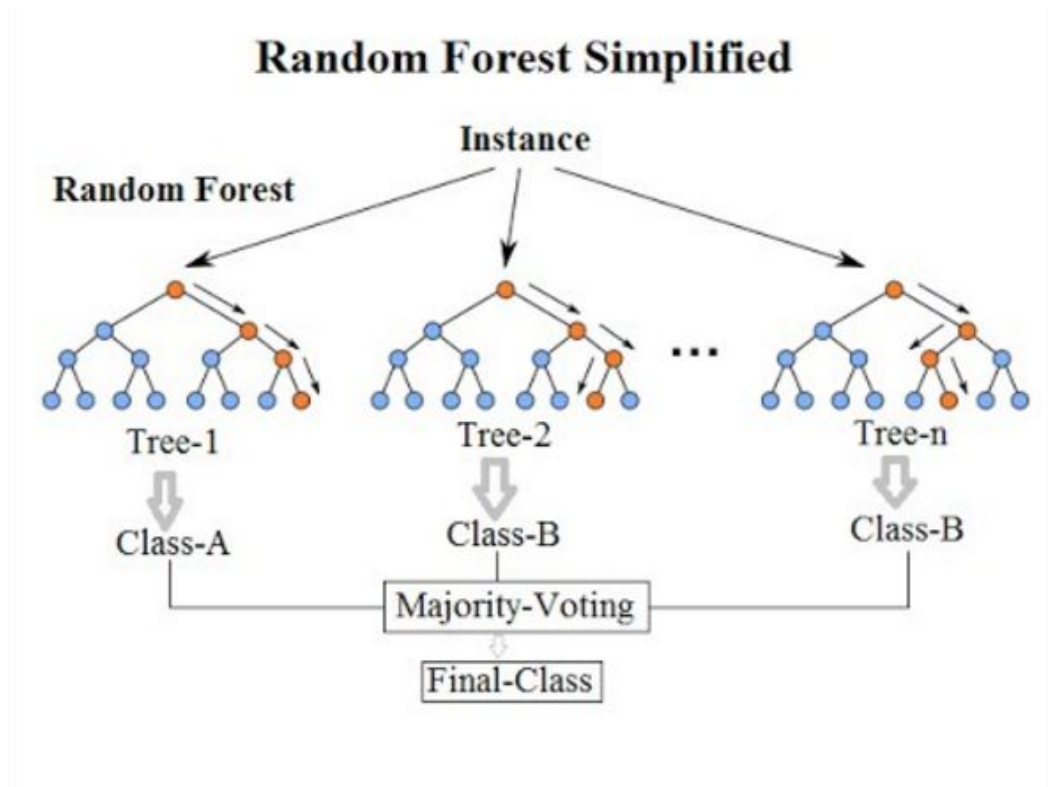
Prediction Result

- Initial Result produced 69% accuracy.
- Grid Search to look for better parameters.
- Optimal parameters yield 70.4% accuracy.

Parameters we used
for Grid Search

```
n_estimators = [200, 300]
max_depth = [5, 15, None]
max_features = ['auto', 'sqrt', 'log2']
criterion = ['gini', 'entropy']
```

Confusion Matrix

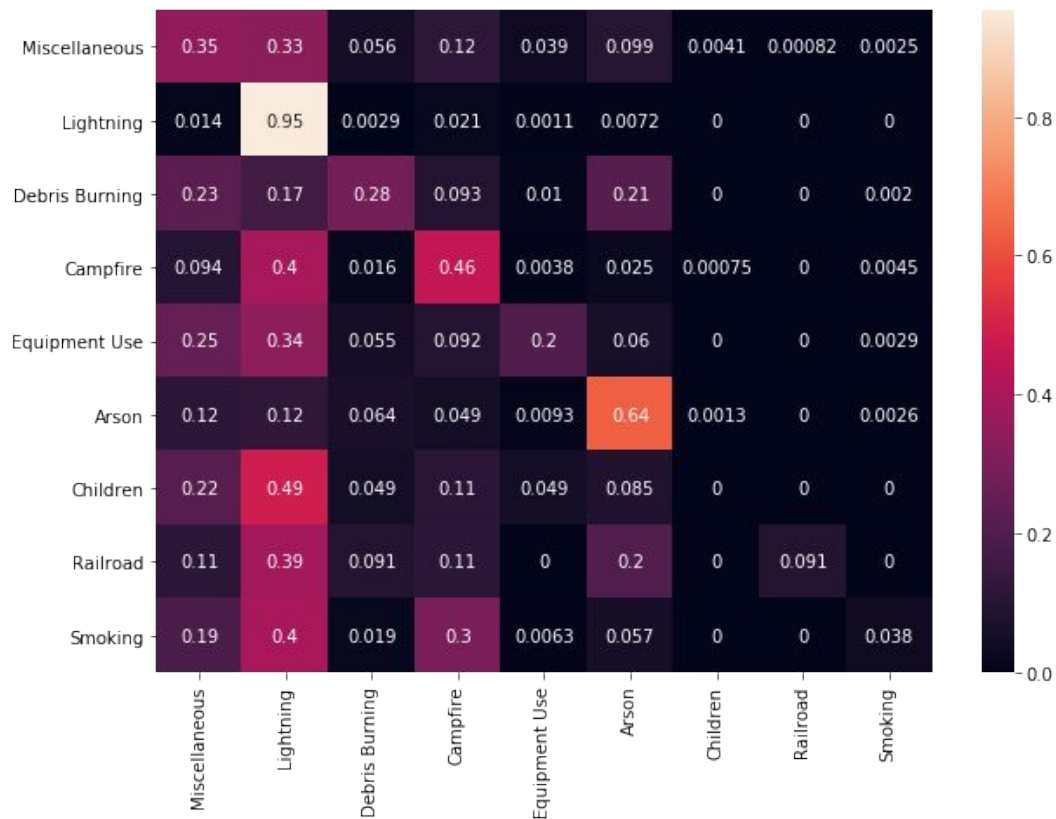- Rows indicate the true labels and columns indicate the prediction results

Inferences

- California, Alaska and Idaho - have the worst fires every year
- Containment of fires in Alaska is better when compared to California while New York is the has the most delayed response
- Miscellaneous reason & Lightening are the top causes for fires
- Western USA is more prone to fires than eastern/central
- Summer is the most prominent season for forest fires

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THANK YOU!

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