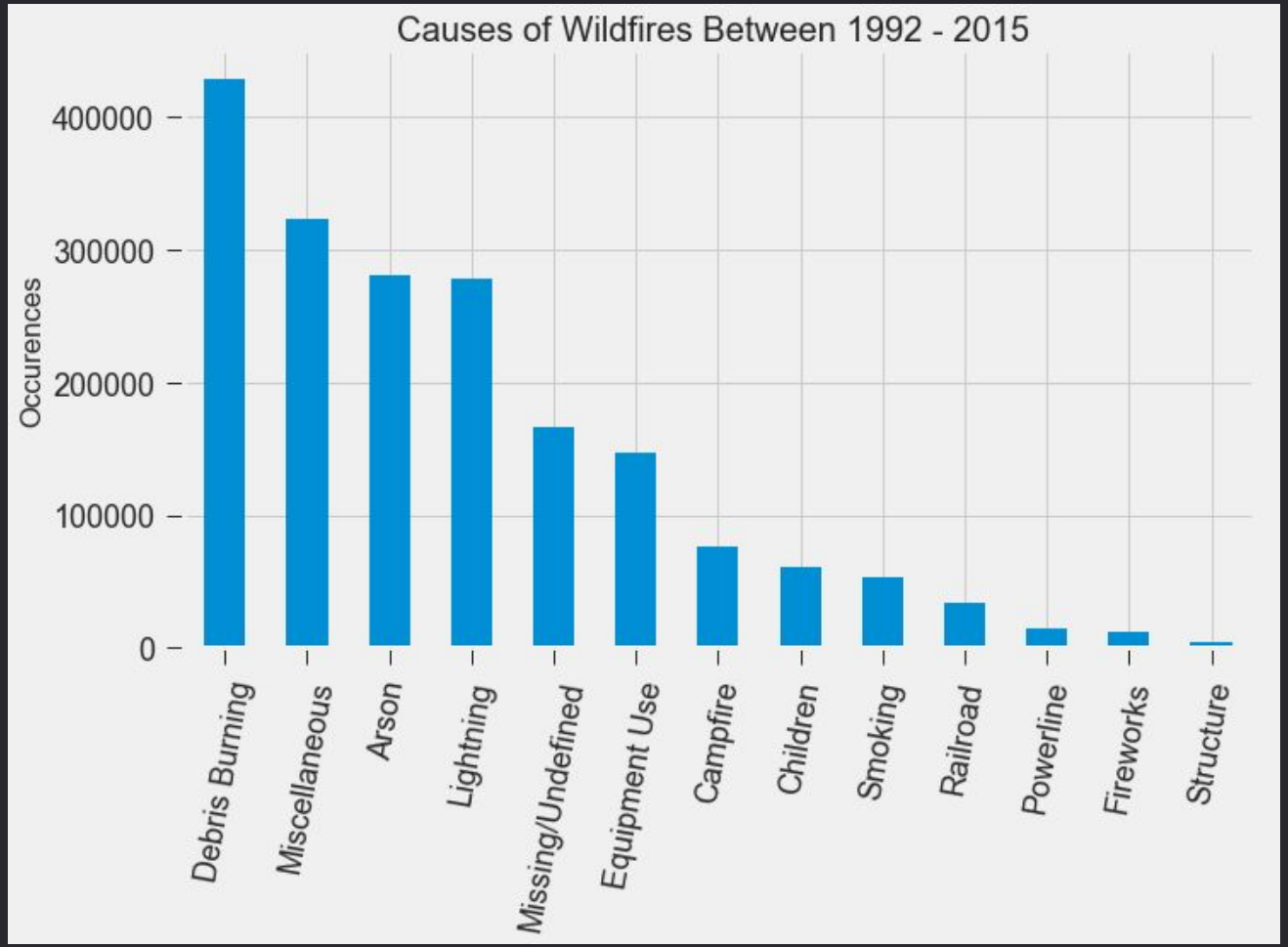
WILDFIRES in the US

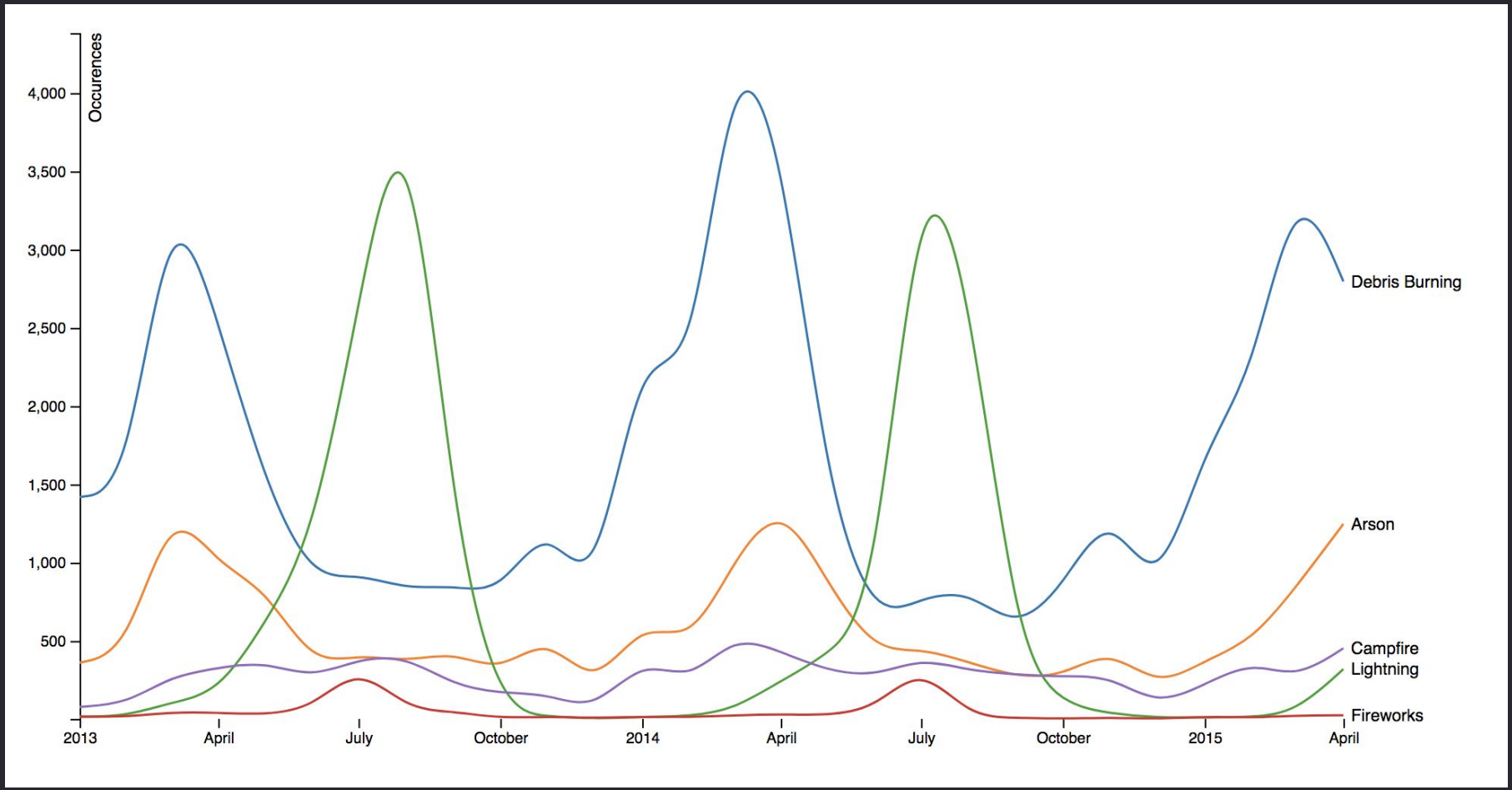
KENNY LEUNG

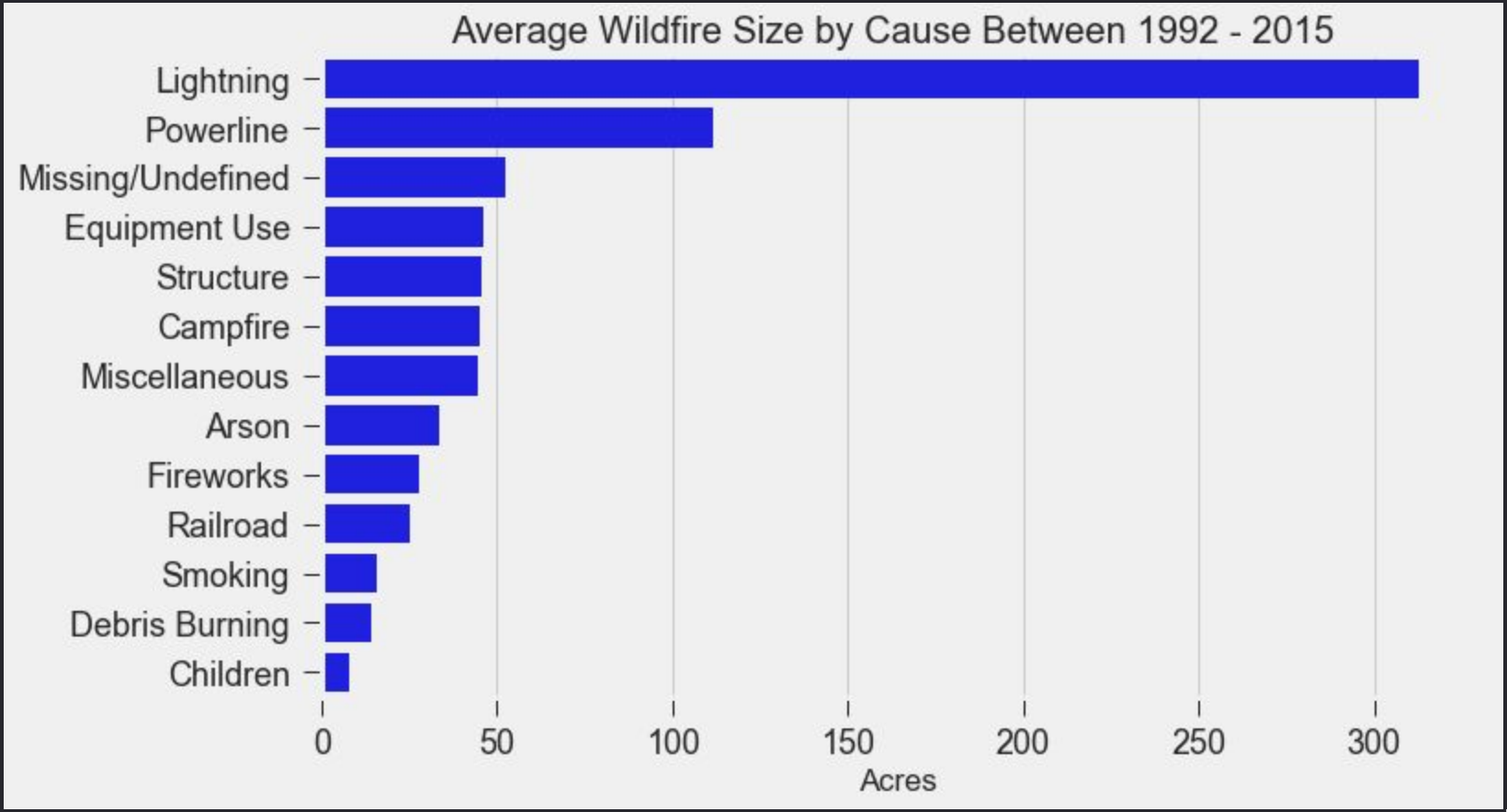
QUESTION / MOTIVATION

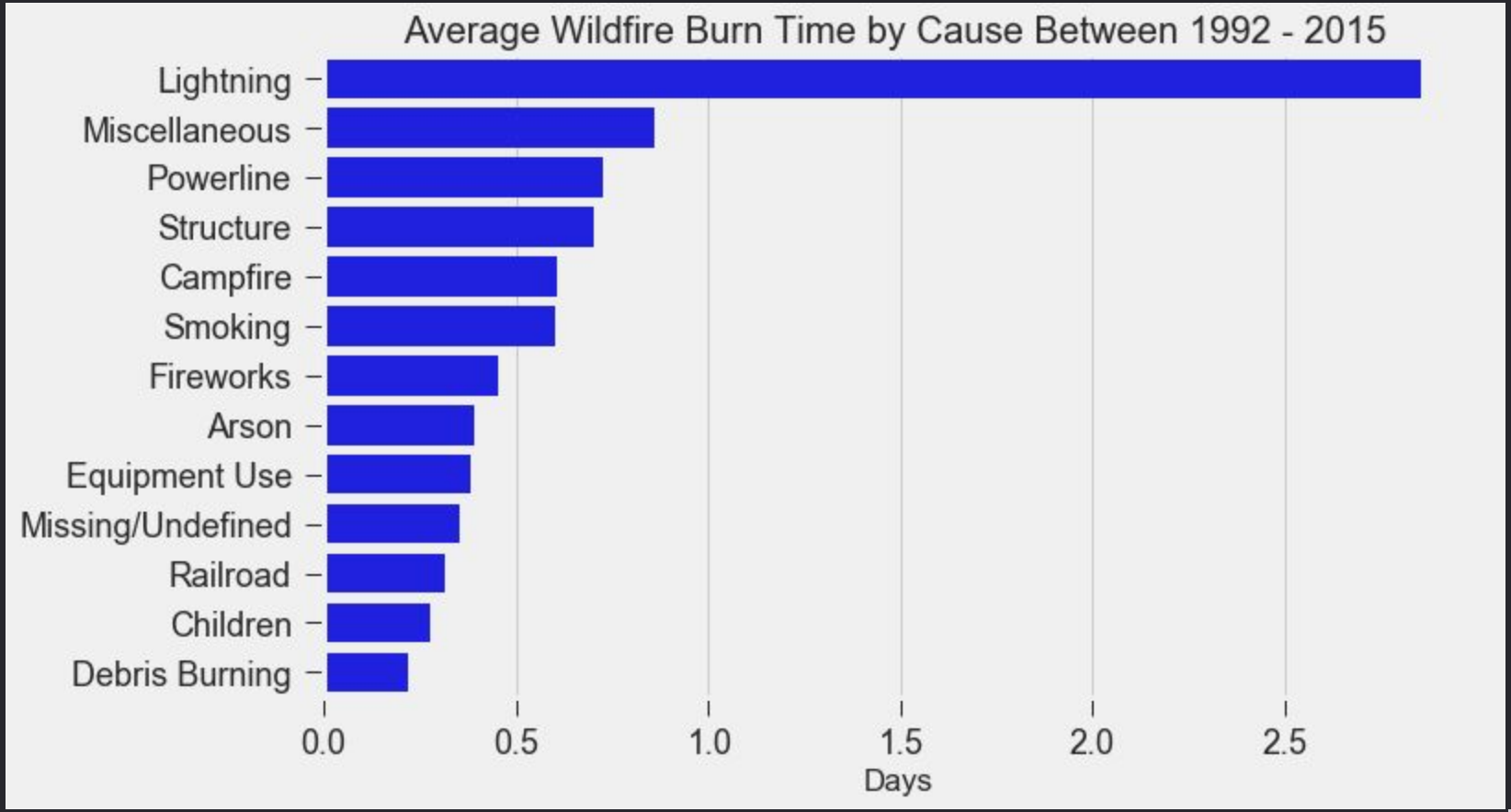
Can we predict the cause of a wildfire?

TARGET


Causes of Wildfires Between 1992 - 2015
Occurences
400000
300000
200000
100000
0
Debris Burning
Miscellaneous
Arson
Lightning
Missing/Undefined
Equipment Use
Campfire
Children
Smoking
Railroad
Powerline
Fireworks
Structure


Occurences
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
2013
April
July
October
2014
April
July
October
2015
April
Debris Burning
Arson
Campfire
Lightning
Fireworks

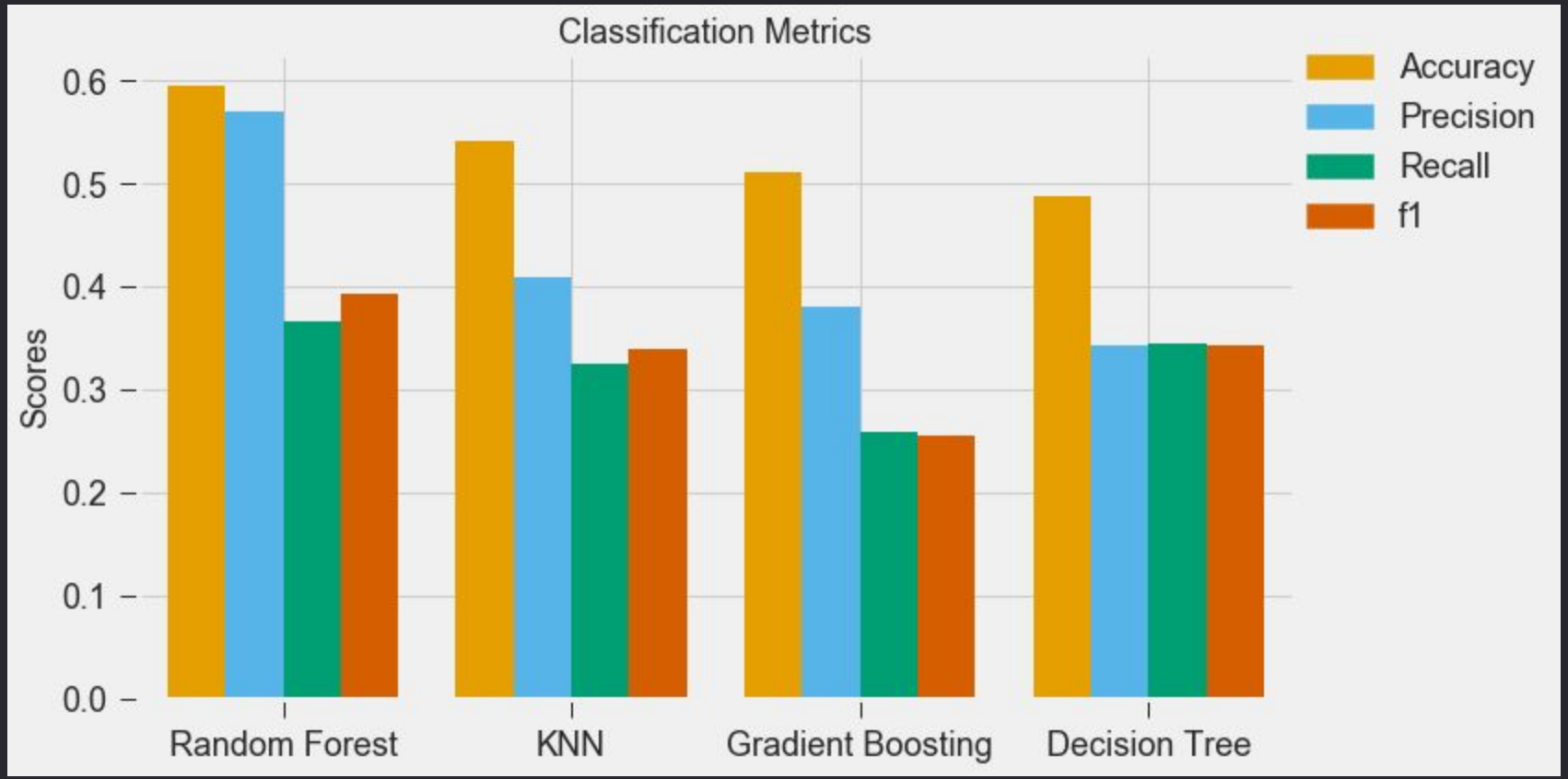

Average Wildfire Size by Cause Between 1992 - 2015
Lightning
Powerline
Missing/Undefined
Equipment Use
Structure
Campfire
Miscellaneous
Arson
Fireworks
Railroad
Smoking
Debris Burning
Children
0
50
100
150
200
250
300
Acres

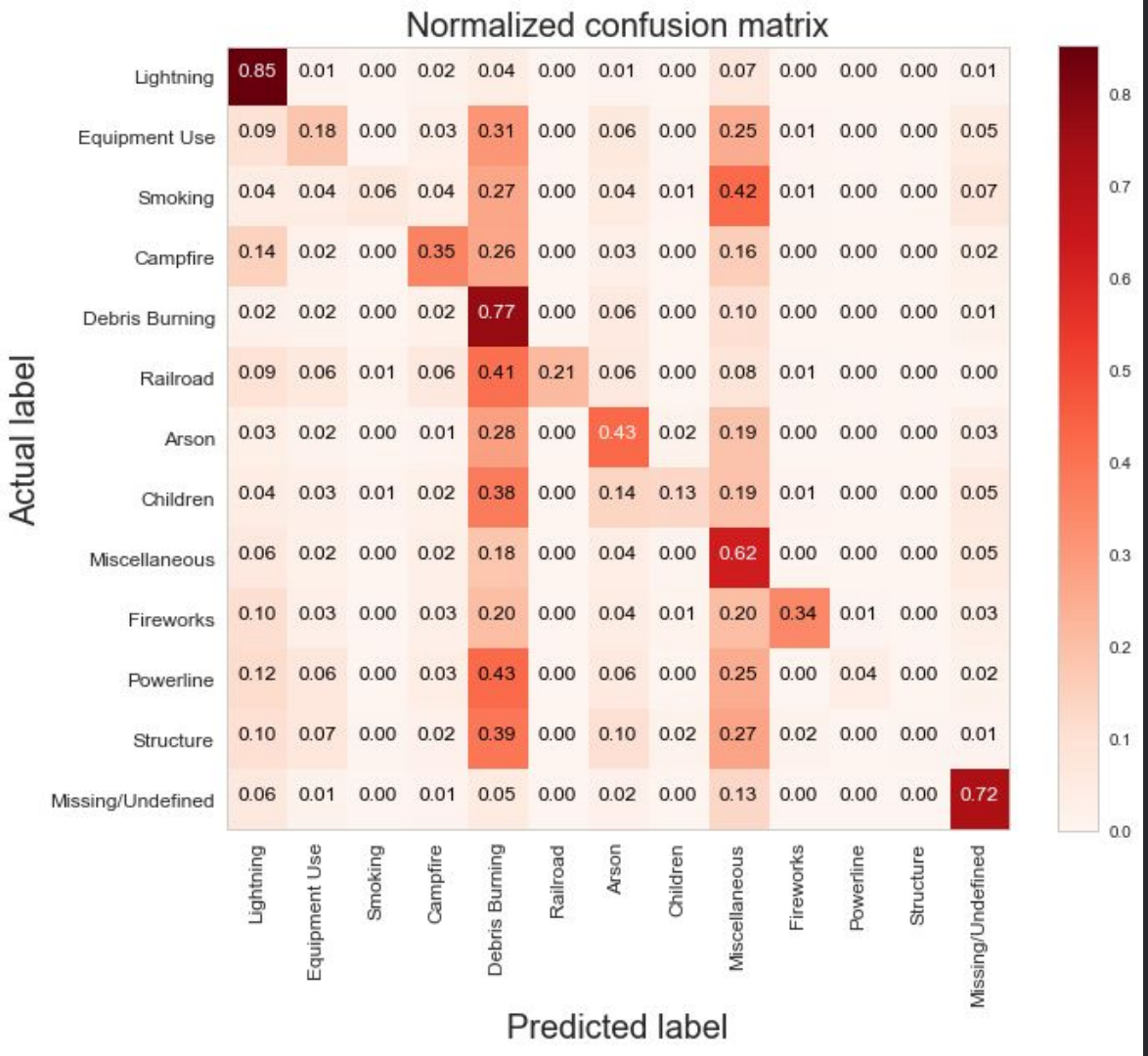

Average Wildfire Burn Time by Cause Between 1992 - 2015
Lightning
Miscellaneous
Powerline
Structure
Campfire
Smoking
Fireworks
Arson
Equipment Use
Missing/Undefined
Railroad
Children
Debris Burning
0.0
0.5
1.0
1.5
2.0
2.5
Days

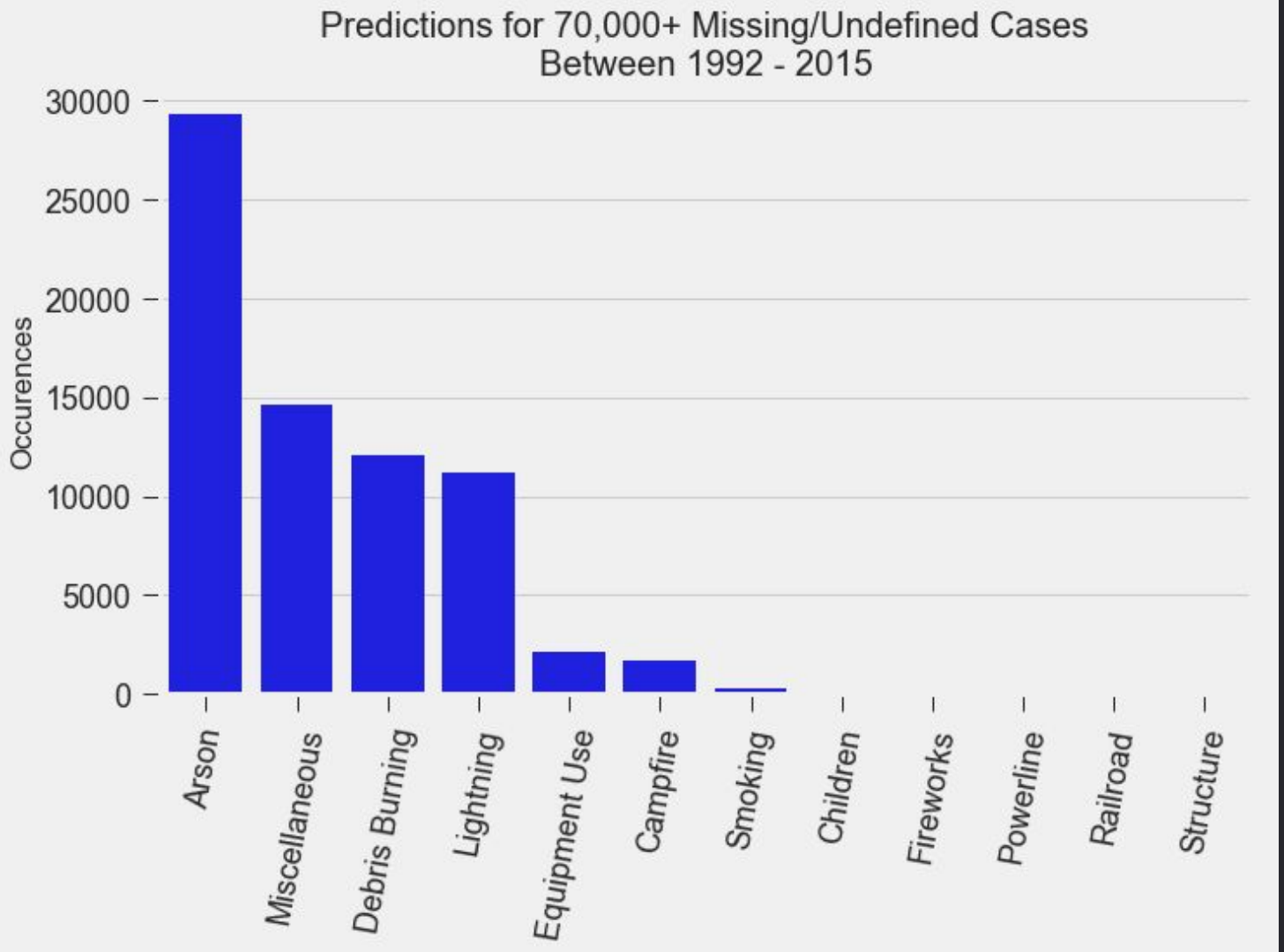
FEATURE IMPORTANCE

1) Location of Fire (Latitude, Longitude)
2) Day of Year Fire Discovered
3) State in which Fire Occurred
4) Final Fire Size
5) Days Taken to Contain Fire
6) Year of Fire Event

RESULTS


Classification Metrics
Accuracy
Precision
Recall
f1
Scores
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Random Forest
KNN
Gradient Boosting
Decision Tree


Normalized confusion matrix
Actual label
Predicted label
Lightning
Equipment Use
Smoking
Campfire
Debris Burning
Railroad
Arson
Children
Miscellaneous
Fireworks
Powerline
Structure
Missing/Undefined
0.85 0.01 0.00 0.02 0.04 0.00 0.01 0.00 0.07 0.00 0.00 0.00 0.01
0.09 0.18 0.00 0.03 0.31 0.00 0.06 0.00 0.25 0.01 0.00 0.00 0.05
0.04 0.04 0.06 0.04 0.27 0.00 0.04 0.01 0.42 0.01 0.00 0.00 0.07
0.14 0.02 0.00 0.35 0.26 0.00 0.03 0.00 0.16 0.00 0.00 0.00 0.02
0.02 0.02 0.00 0.02 0.77 0.00 0.06 0.00 0.10 0.00 0.00 0.00 0.01
0.09 0.06 0.01 0.06 0.41 0.21 0.06 0.00 0.08 0.01 0.00 0.00 0.00
0.03 0.02 0.00 0.01 0.28 0.00 0.43 0.02 0.19 0.00 0.00 0.00 0.03
0.04 0.03 0.01 0.02 0.38 0.00 0.14 0.13 0.19 0.01 0.00 0.00 0.05
0.06 0.02 0.00 0.02 0.18 0.00 0.04 0.00 0.62 0.00 0.00 0.00 0.05
0.10 0.03 0.00 0.03 0.20 0.00 0.04 0.01 0.20 0.34 0.01 0.00 0.03
0.12 0.06 0.00 0.03 0.43 0.00 0.06 0.00 0.25 0.00 0.04 0.00 0.02
0.10 0.07 0.00 0.02 0.39 0.00 0.10 0.02 0.27 0.02 0.00 0.00 0.01
0.06 0.01 0.00 0.01 0.05 0.00 0.02 0.00 0.13 0.00 0.00 0.00 0.72
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0


Predictions for 70,000+ Missing/Undefined Cases
Between 1992 - 2015
Occurences
30000
25000
20000
15000
10000
5000
0
Arson
Miscellaneous
Debris Burning
Lightning
Equipment Use
Campfire
Smoking
Children
Fireworks
Powerline
Railroad
Structure

QUESTIONS?