Will PG&E cut down your power?

Estimating the scale and duration of wildfire

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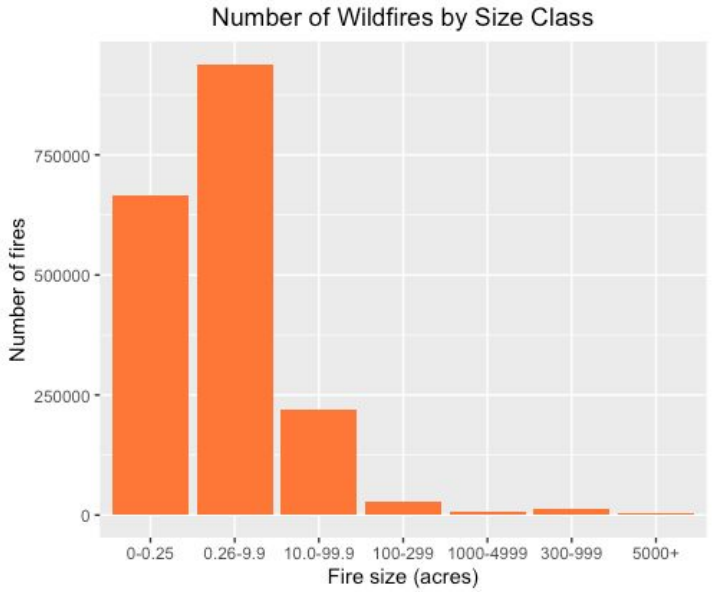
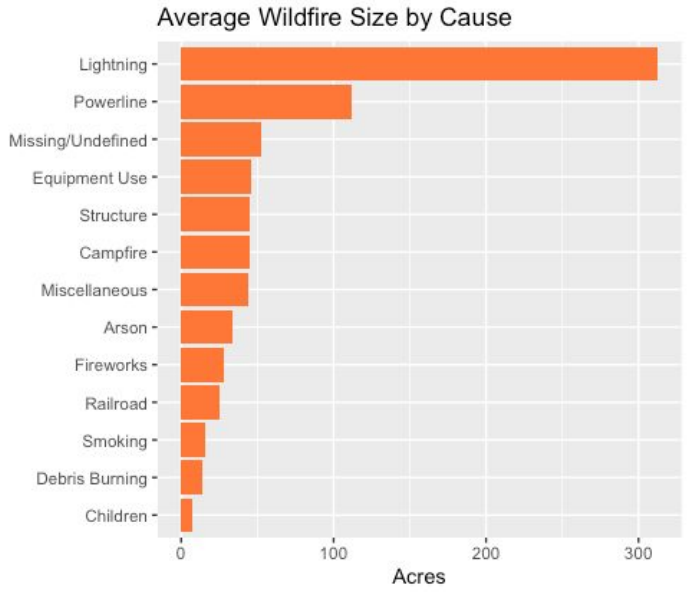
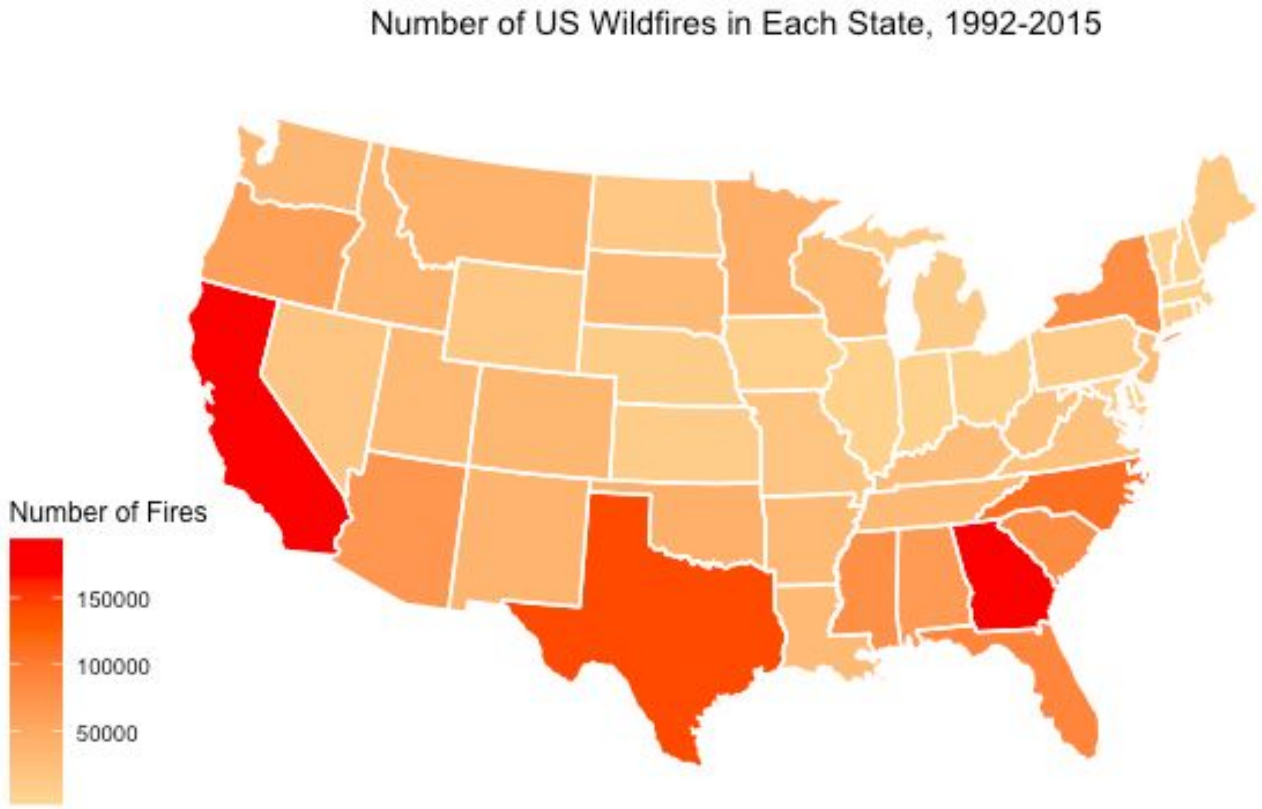
Wildfire behavior: uneven distribution of size and duration graphically and timely. California is hot.

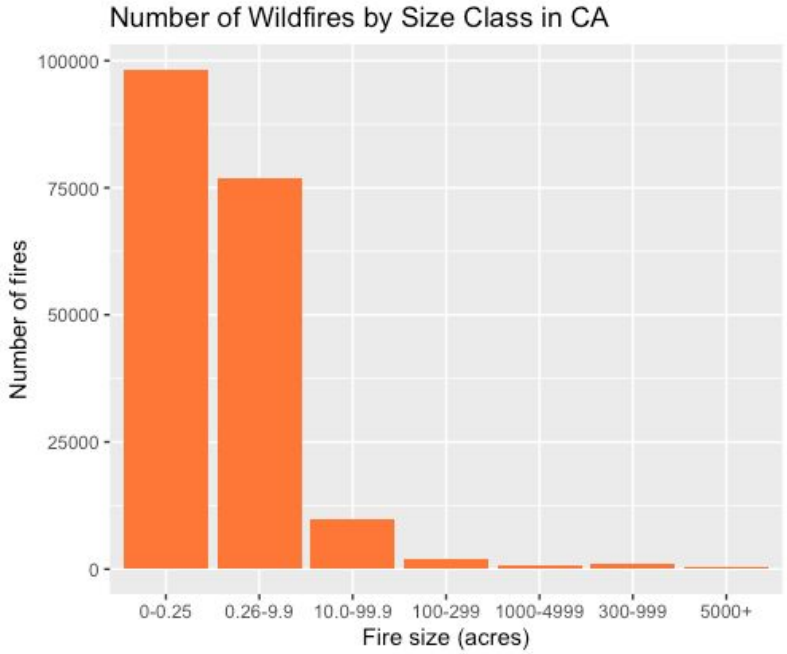


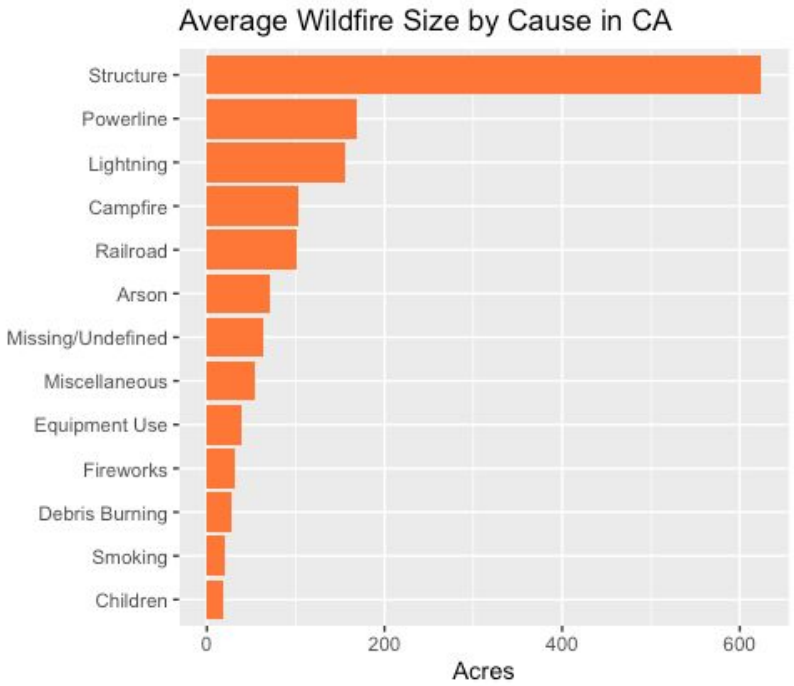


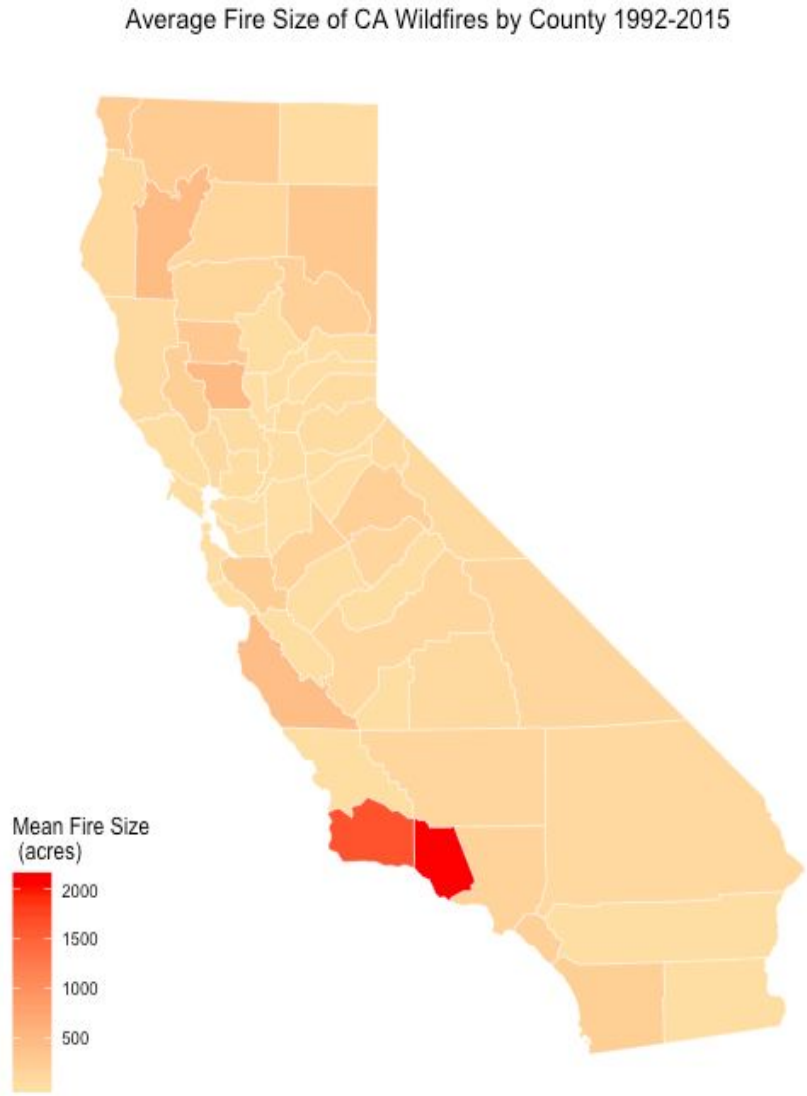


Data source: US fire program system

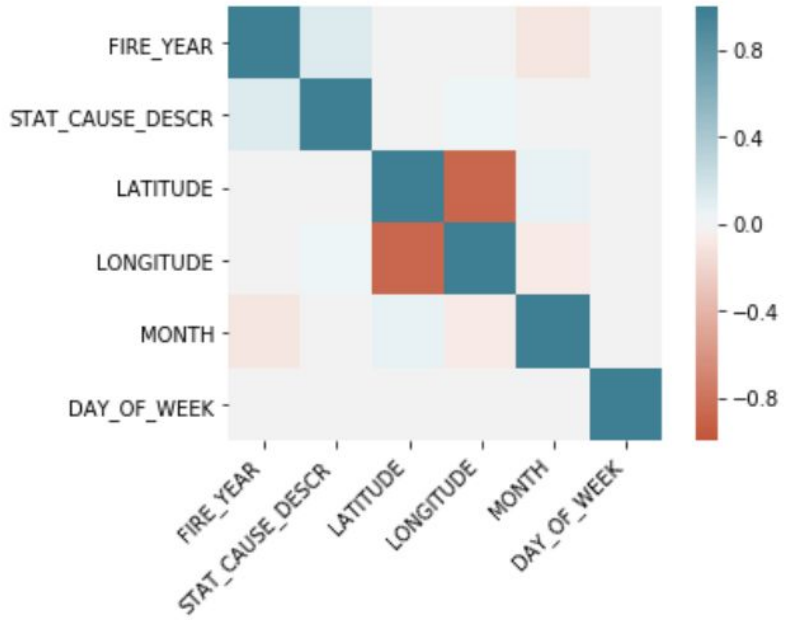
Wildfire in California: Not big, but frequent

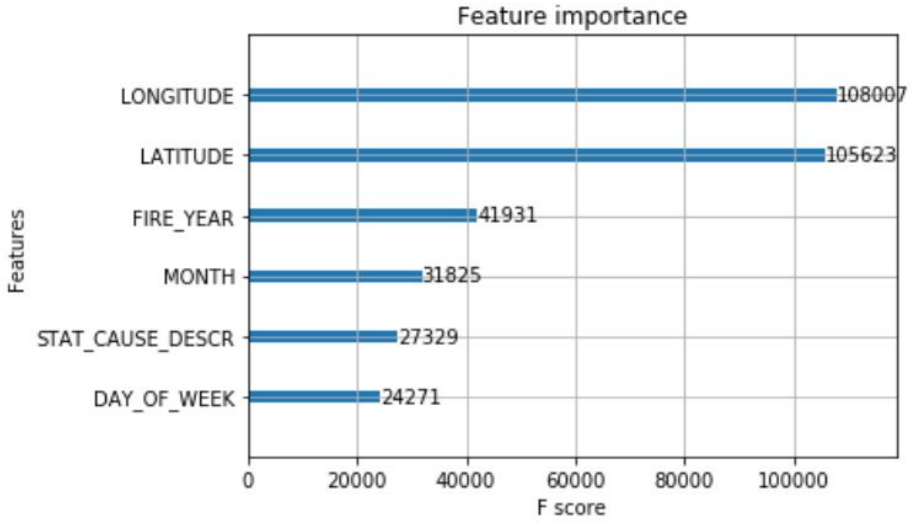






Forecasting wildfire scale: XGBoost Method





1. Selecting Features:
   X : Year, cause, coordinations, month and weekdays.
   Y : the classes of wildfile scale (0-7)

2. Checking correlations:
   No strong correlation between the features.

3. Fitting the Prediction Model:
   Use **XGBoost Classifier** for the dataset of California.
   (over 180,000 instances)

	precision	recall	f1-score	support
A=0-0.25 acres	0.64	0.76	0.69	32330
B=0.26-9.9 acres	0.57	0.53	0.55	25547
C=10.0-99.9 acres	0.00	0.00	0.00	3213
D=100-299 acres	0.00	0.00	0.00	698
E=300 to 999 acres	0.00	0.00	0.00	389
F=1000 to 4999 acres	0.00	0.00	0.00	248
G=5000+ acres	0.00	0.00	0.00	127
accuracy			0.61	62552
macro avg	0.17	0.18	0.18	62552
weighted avg	0.56	0.61	0.58	62552

accuracy: 61%
baseline: 34.3%

4. Checking the importance of each feature:
   The location matters most, then the date comes second.

How to predict the duration once fire occured? SVM: A multi-classification method

whole data set

random-selected(80%)

(Step 1: Split data)

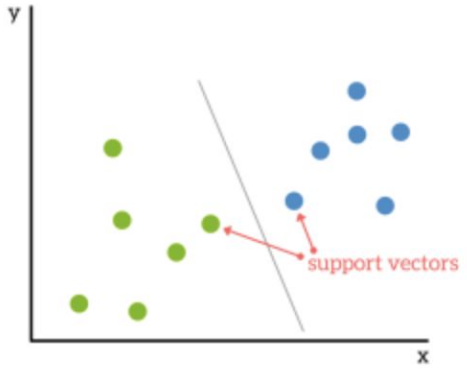
random-selected(20%)

training data

test data

(Step 2: Training and Feature selection)

(Step 3: confusion matrix)



SVM divides(classifies) data points using hyperplanes*

Features: Fire Source, Location, Time and Size

Target: # of days of wildfire duration

		Predicted Duration													
(Unit: **Day**)		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Actual	**0**	15012	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Duration	**1**	2106	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	384	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3	179	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4	113	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	6	52	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	7	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8	31	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	9	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	11	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	12	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	14	13	0	0	0	0	0	0	0	1	0	0	0	0	0	0

83% Correct Prediction

*Source: Wikipedia

Result:
Foresee the scale and the duration of wildfires

Application:

- reduce the cost of facing such disasters
- get fully prepared for fires

Thanks for your time.