This notebook is created by

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It provides a historical analysis of the wildfire events occurred in the USA in between 2015 and 2018.

Data Import

```
data_18= readtable('StormEvents_2018.csv');
data_17= readtable('StormEvents_2017.csv');
data_16= readtable('StormEvents_2016.csv');
data_15= readtable('StormEvents_2015.csv');
data_14= readtable('StormEvents_2014.csv');
```

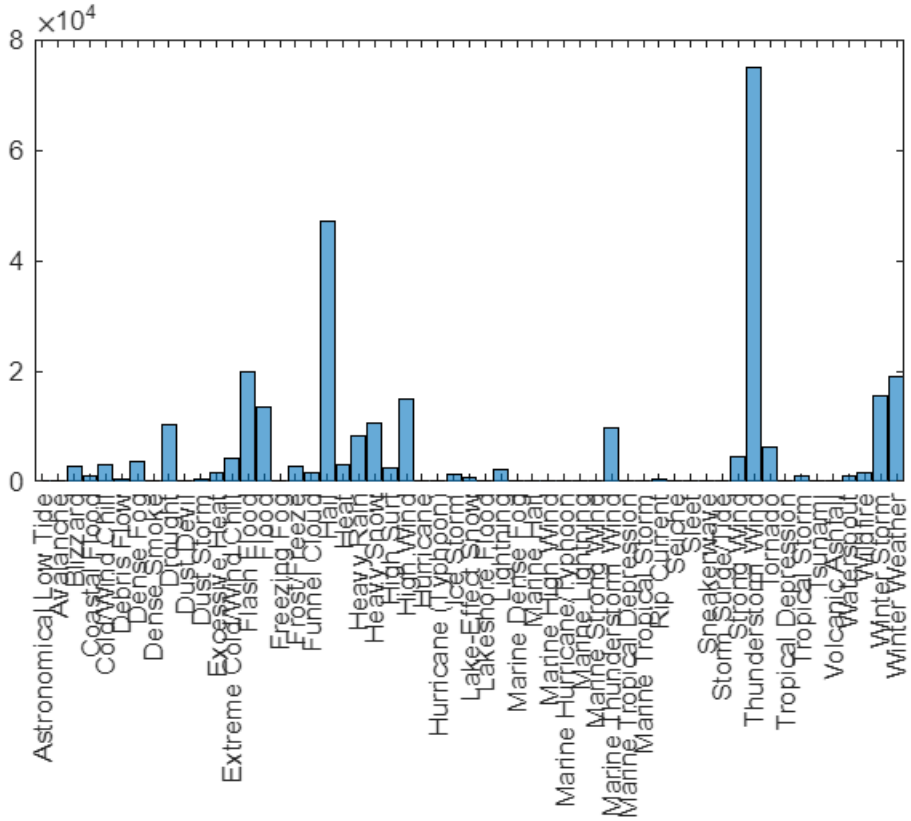
```
% joining the data
df= vertcat(data_18, data_17, data_16, data_15, data_14);
head(df,10)
```

```
ans = 10×23 table
```

...

	EpisodeID	Event_ID	State	Year	Month	Event_Type
1	125578	753161	'NEBRASKA'	2018	'June'	'Hail'
2	125578	753160	'NEBRASKA'	2018	'June'	'Hail'
3	125988	755273	'VERMONT'	2018	'June'	'Thunderstorm Wind'
4	125988	755929	'VERMONT'	2018	'June'	'Thunderstorm Wind'
5	125578	753163	'NEBRASKA'	2018	'June'	'Tornado'
6	124972	749541	'KENTUCKY'	2018	'June'	'Thunderstorm Wind'
7	125038	749892	'KENTUCKY'	2018	'June'	'Thunderstorm Wind'
8	125413	752081	'KENTUCKY'	2018	'June'	'Thunderstorm Wind'
9	125413	752077	'KENTUCKY'	2018	'June'	'Thunderstorm Wind'
10	125578	753166	'NEBRASKA'	2018	'June'	'Thunderstorm Wind'

```
% event count
histogram(df.Event_Type)
```



Hail and thunder storms are most frequent.

Wildfire events

```
wf= df(df.Event_Type == "Wildfire",:);
head(wf,5)
```

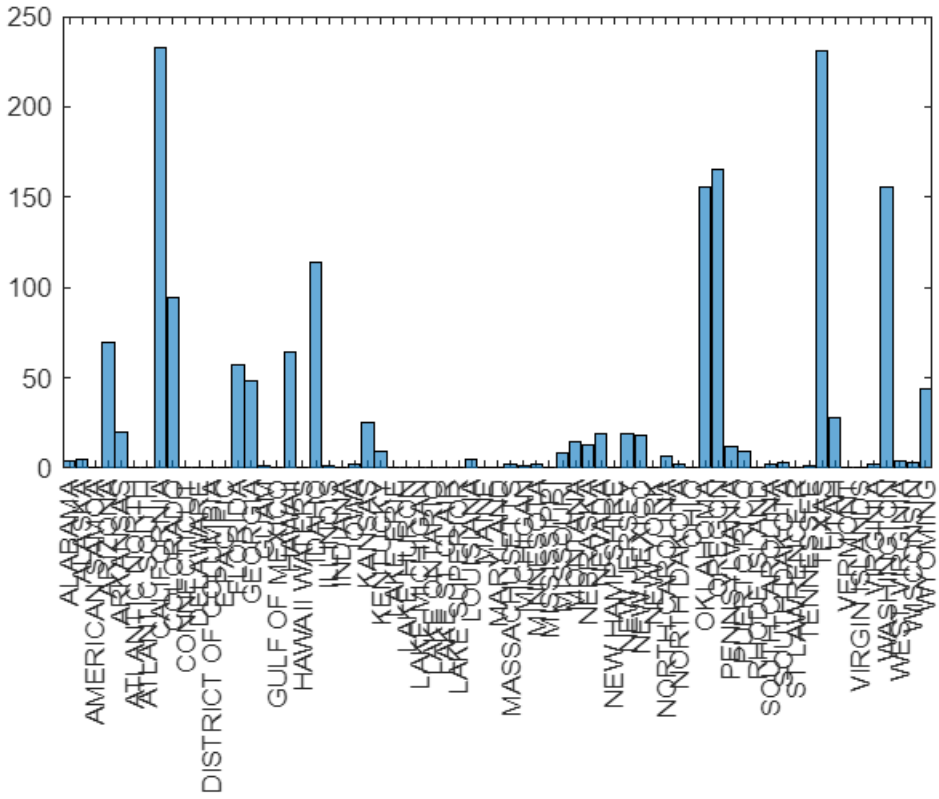
```
ans = 5×23 table
```

...

	EpisodeID	Event_ID	State	Year	Month	Event_Type
1	122949	737149	OKLAHOMA	2018	February	Wildfire
2	122950	737150	OKLAHOMA	2018	February	Wildfire
3	124315	745838	OKLAHOMA	2018	March	Wildfire
4	124316	745839	TEXAS	2018	March	Wildfire
5	125744	754080	TEXAS	2018	March	Wildfire

By State

```
% wildfire events count by state
histogram(wf.State)
```



California and Texas are mostly affected by wildfires.

By month

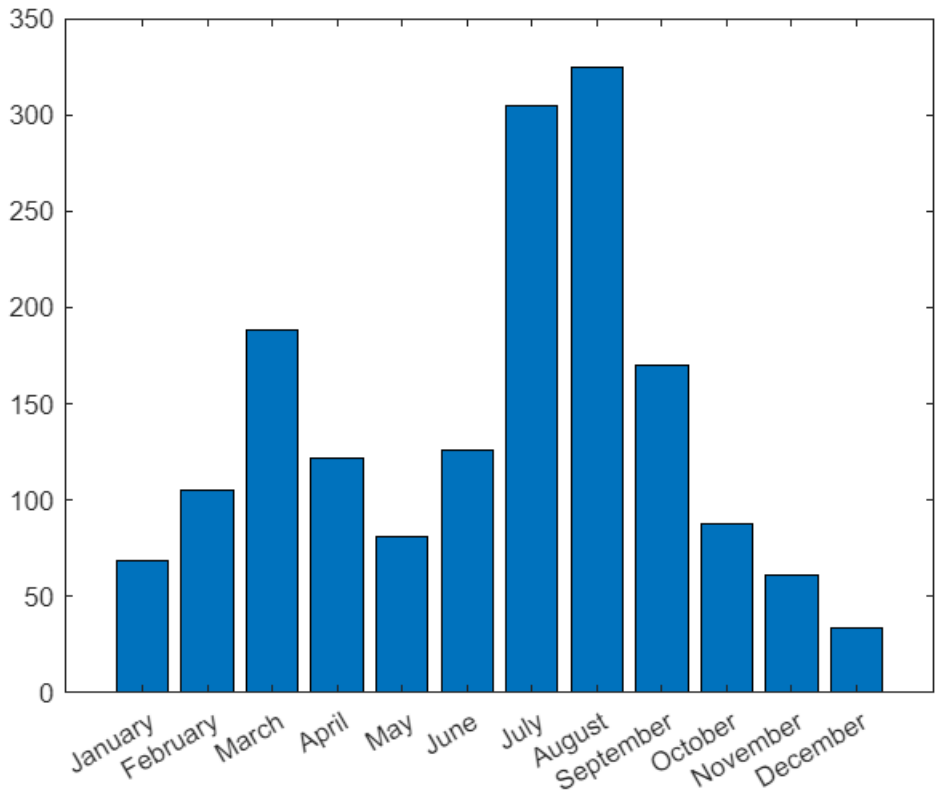
```
% monthly occurrence
wm=groupcounts(wf, 'Month')
```

wm = 12×3 table

	Month	GroupCount	Percent
1	April	122	7.2879
2	August	325	19.4146
3	December	34	2.0311
4	February	105	6.2724
5	January	69	4.1219
6	July	305	18.2198
7	June	126	7.5269
8	March	188	11.2306
9	May	81	4.8387
10	November	61	3.6440

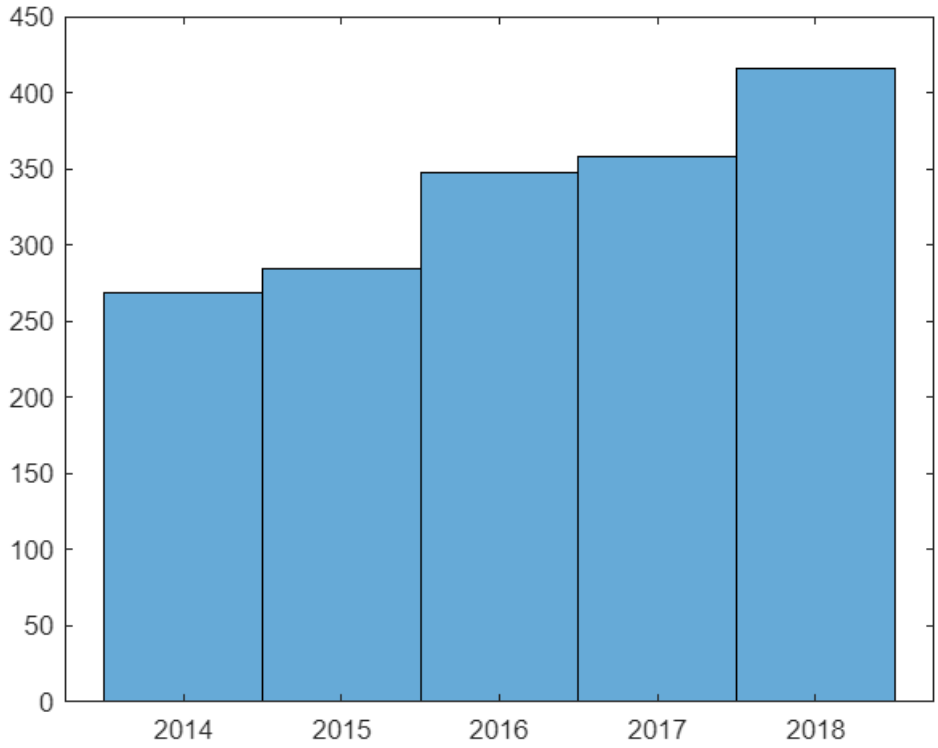
	Month	GroupCount	Percent
11	October	88	5.2569
12	September	170	10.1553

```
month= {'January','February', 'March','April', 'May', 'June', 'July', 'August', 'September', 'O
val = [69,105,188,122,81,126,305,325,170,88,61,34];
bar(val)
xticklabels(month)
```



By year

```
h= histogram(wf.Year)
```




```
h =
  Histogram with properties:

            Data: [1674×1 double]
          Values: [269 284 347 358 416]
         NumBins: 5
        BinEdges: [2.0135e+03 2.0145e+03 2.0155e+03 2.0165e+03 2.0175e+03 2.0185e+03]
        BinWidth: 1
       BinLimits: [2.0135e+03 2.0185e+03]
    Normalization: 'count'
        FaceColor: 'auto'
        EdgeColor: [0 0 0]

  Show all properties
```

Removing unnecessary columns

```
wf2 = removevars(wf, {'EpisodeID','Event_ID','Begin_Date_Time','Event_Type','Timezone','End_Dat
```

Death counts

```
wf2.death= wf2.Deaths_Direct + wf2.Deaths_Indirect;
wf2.injuries = wf2.Injuries_Direct + wf2.Injuries_Indirect;
wf2.casualties = wf2.death + wf2.injuries;
head(wf2,5)
```

```
ans = 5×16 table
```

...

	State	Year	Month	Injuries_Direct	Injuries_Indirect
1	OKLAHOMA	2018	February	0	0
2	OKLAHOMA	2018	February	0	0
3	OKLAHOMA	2018	March	0	0
4	TEXAS	2018	March	1	0
5	TEXAS	2018	March	0	0

```
sum(wf2.casualties)
```

```
ans = 497
```

```
sum(wf2.death)
```

```
ans = 159
```

There were in total 159 deaths in the last 5 years. lets see the distribution by year.

```
dy= groupsummary(wf2,"Year","sum","death")
```

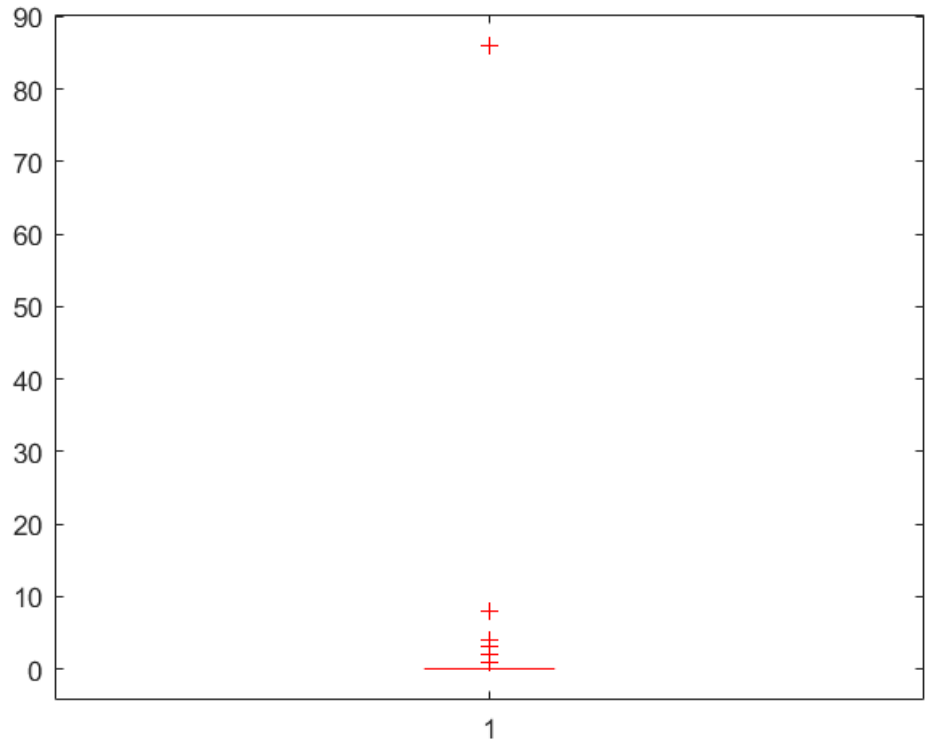
```
dy = 5×3 table
```

	Year	GroupCount	sum_death
1	2014	269	5
2	2015	284	10
3	2016	347	6
4	2017	358	25
5	2018	416	113

2018 saw a huge number of deaths. What could be the reason?

Major wildfire events

```
boxplot(wf2.death)
```



one event caused huge number of deaths.

```
[val, ind]=maxk(wf2.death,5)
```

```
val = 5×1
    86
     8
     4
     4
     3
ind = 5×1
         412
         417
         709
        1362
          62
```

```
max_death_event= wf2(412,:)
```

```
max_death_event = 1×16 table
```

...

	State	Year	Month	Injuries_Direct	Injuries_Indirect
1	CALIFORNIA	2018	November	0	12

This particular incident in California casued huge casualties and property damage (estimated amount 17B USD). Let's look at the event narrative.

```
max_death_event.Episode_Narrative
```

```
ans = 1×1 cell array
    {'An extended period of dry weather through the summer and fall with above normal temperatures coupled with a gu
```

```
% the most destructive wildfire in the history of California
string(max_death_event.Event_Narrative)
```

```
ans =
"The Camp Fire began on the morning of November 8, 2018, by Camp Creek Road, near Pulga in Butte County. The fire wa
```

Details can be found here - https://en.wikipedia.org/wiki/2018_California_wildfires

Property damage by wildfires

```
wf2.Property_Cost= fillmissing(wf2.Property_Cost, "constant",0);
wf2.Crop_Cost = fillmissing(wf2.Crop_Cost, 'constant', 0);
head(wf2,6)
```

ans = 1×1 table

...

	State	Year	Month	Injuries_Direct	Injuries_Indirect
1	OKLAHOMA	2018	February	0	0
2	OKLAHOMA	2018	February	0	0
3	OKLAHOMA	2018	March	0	0
4	TEXAS	2018	March	1	0
5	TEXAS	2018	March	0	0
6	TEXAS	2018	March	0	0

```
wf2.total_cost= wf2.Property_Cost + wf2.Crop_Cost;
```

```
sum(wf2.total_cost)/1e9
```

```
ans = 19.5316
```

Thats 19.5 Billion USD

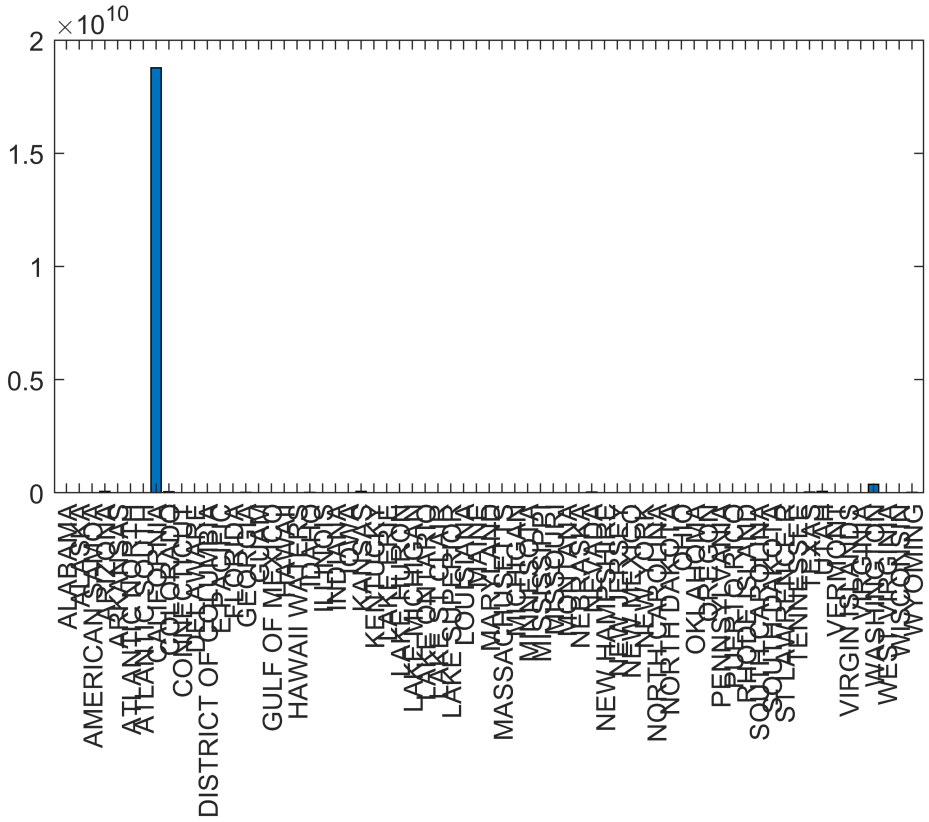
```
% damage by state
ts= groupsummary(wf2,"State","sum","total_cost");
```

```
sortrows(ts,"sum_total_cost")
```

ans = 1×1 table | Reduced from 41 rows

	State
1	'The Higgins ...

```
bar(ts.State,ts.sum_total_cost,'DisplayName','ts.sum_total_cost')
```



California singelhandedly suffered the most damage to property than all other states combined. What about Texas?

Texas events

```
texas = wf2(wf2.State=="TEXAS",:);
head(texas, 10)
```

ans = 1×1 table | Reduced from 10 rows

	State
1	'The Higgin...

The cost to property information is not available for most cases in Texas. Lets see what the event narratives are.

```
groupcounts(texas,"Year")
```

ans = 1×1 table | Reduced from 5 rows

	Year
1	'The Higgin...

2018 saw an increase of events (almost double than previous year).

```
texas_14= texas(texas.Year== 2014, :)
```

texas_14 = 27×17 table

...

	State	Year	Month	Injuries_Direct	Injuries_Indirect
1	TEXAS	2014	August	0	0
2	TEXAS	2014	August	0	0
3	TEXAS	2014	August	0	0
4	TEXAS	2014	January	0	0
5	TEXAS	2014	January	0	0
6	TEXAS	2014	February	0	0
7	TEXAS	2014	March	0	0
8	TEXAS	2014	February	0	0
9	TEXAS	2014	March	0	0
10	TEXAS	2014	March	0	0
11	TEXAS	2014	March	0	0
12	TEXAS	2014	April	0	0
13	TEXAS	2014	May	0	0
14	TEXAS	2014	May	0	0
15	TEXAS	2014	May	0	0
16	TEXAS	2014	June	0	0
17	TEXAS	2014	June	0	0
18	TEXAS	2014	July	0	0
19	TEXAS	2014	November	0	0
20	TEXAS	2014	February	0	0
21	TEXAS	2014	March	0	0
22	TEXAS	2014	April	0	0
23	TEXAS	2014	April	0	0
24	TEXAS	2014	April	0	0

	State	Year	Month	Injuries_Direct	Injuries_Indirect
25	TEXAS	2014	March	0	0
26	TEXAS	2014	March	0	0
27	TEXAS	2014	March	0	0

```
texas_14(end,"Episode_Narrative")
```

ans = 1×1 table

	Episode_Narrative
1	'The Higgins 2 Wildfire began approximately 1540CST around four to five m...