USA'S STORM EVENTS 2017

Background and Scope

Import the Data

```
events = importStormEvents2017("StormEvents_2017_finalProject.csv");
events = removevars(events, {'EpisodeID','Event_ID','Timezone','Episode_Narrative','Event_Narra
```

events = 57005×19 table

	State	Year	Month	Event_Type	CZ_Name	Begin_Date_Time	End_Date_Time
1	NEW JER...	2017	April	Thunderstorm Wind	GLOUCESTER	2017-04-06 15:09...	2017-04-06 15:...
2	FLORIDA	2017	April	Tornado	LEE	2017-04-06 09:30...	2017-04-06 09:...
3	OHIO	2017	April	Thunderstorm Wind	GREENE	2017-04-05 17:49...	2017-04-05 17:...
4	OHIO	2017	April	Flood	CLERMONT	2017-04-16 17:59...	2017-04-16 19:...
5	NEBRASKA	2017	April	Hail	CASS	2017-04-15 15:50...	2017-04-15 15:...
6	INDIANA	2017	April	Flash Flood	SWITZERLAND	2017-04-29 09:15...	2017-04-29 11:...
7	VIRGINIA	2017	April	Thunderstorm Wind	WESTMOREL...	2017-04-21 19:15...	2017-04-21 19:...
8	GULF OF...	2017	October	Marine Thunders...	ATCHAFALA...	2017-10-22 10:15...	2017-10-22 10:...
9	OHIO	2017	April	Flash Flood	CLERMONT	2017-04-29 09:45...	2017-04-29 11:...
10	NEBRASKA	2017	April	Thunderstorm Wind	BURT	2017-04-15 18:55...	2017-04-15 18:...
11	ARKANSAS	2017	April	Hail	FRANKLIN	2017-04-26 07:57...	2017-04-26 07:...
12	OKLAHOMA	2017	October	Hail	KIOWA	2017-10-21 15:20...	2017-10-21 15:...
13	ATLANTI...	2017	October	Marine Strong W...	DE BAY WA...	2017-10-24 02:24...	2017-10-24 02:...
14	ATLANTI...	2017	October	Marine High Wind	DE BAY WA...	2017-10-24 03:36...	2017-10-24 03:...

:
:

```
%States impacted by Harvey
events = events(ismember(events.State,{'ARKANSAS','KENTUCKY','LOUISIANA','MISSISSIPPI','NORTH C

%Harvey related events occured from 17th Aug. to 3rd Sept.
events = events(events.Begin_Date_Time >= '2017-08-17 00:00:00' & events.Begin_Date_Time < '201
```

events = 579×19 table

	State	Year	Month	Event_Type	CZ_Name	Begin_Date_Time	End_Date_Time
1	TEXAS	2017	August	Tropical Storm	MONTGOMERY	2017-08-25 12:00...	2017-08-30 00:...
2	MISSISS...	2017	September	Strong Wind	LOWNDES	2017-09-01 01:00...	2017-09-01 01:...
3	NORTH C...	2017	September	Flash Flood	WAKE	2017-09-01 17:35...	2017-09-01 18:...
4	NORTH C...	2017	September	Flash Flood	CUMBERLAND	2017-09-01 19:20...	2017-09-01 21:...
5	NORTH C...	2017	September	Hail	LEE	2017-09-01 15:20...	2017-09-01 15:...

	State	Year	Month	Event_Type	CZ_Name	Begin_Date_Time	End_Date_Time
6	TEXAS	2017	August	Tropical Storm	FORT BEND	2017-08-26 00:00...	2017-08-30 00:...
7	NORTH C...	2017	September	Hail	WAYNE	2017-09-01 13:50...	2017-09-01 14:...
8	NORTH C...	2017	September	Thunderstorm Wind	RICHMOND	2017-09-01 13:35...	2017-09-01 13:...
9	NORTH C...	2017	September	Thunderstorm Wind	WAYNE	2017-09-01 14:10...	2017-09-01 14:...
10	NORTH C...	2017	September	Thunderstorm Wind	LEE	2017-09-01 14:52...	2017-09-01 14:...
11	NORTH C...	2017	September	Thunderstorm Wind	LEE	2017-09-01 15:00...	2017-09-01 15:...
12	TEXAS	2017	August	Tropical Storm	GALVESTON	2017-08-25 12:00...	2017-08-30 00:...
13	TEXAS	2017	August	Tropical Storm	SAN JACINTO	2017-08-25 12:00...	2017-08-30 00:...
14	NORTH C...	2017	September	Thunderstorm Wind	HARNETT	2017-09-01 15:45...	2017-09-01 15:...

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Two States Most impacted by Harvey

```
events.Total_Cost = events.Property_Cost + events.Crop_Cost;
events = movevars(events, 'Total_Cost', 'Before', 'Begin_Lat')
```

events = 579×20 table

	State	Year	Month	Event_Type	CZ_Name	Begin_Date_Time	End_Date_Time
1	TEXAS	2017	August	Tropical Storm	MONTGOMERY	2017-08-25 12:00...	2017-08-30 00:...
2	MISSISS...	2017	September	Strong Wind	LOWNDES	2017-09-01 01:00...	2017-09-01 01:...
3	NORTH C...	2017	September	Flash Flood	WAKE	2017-09-01 17:35...	2017-09-01 18:...
4	NORTH C...	2017	September	Flash Flood	CUMBERLAND	2017-09-01 19:20...	2017-09-01 21:...
5	NORTH C...	2017	September	Hail	LEE	2017-09-01 15:20...	2017-09-01 15:...
6	TEXAS	2017	August	Tropical Storm	FORT BEND	2017-08-26 00:00...	2017-08-30 00:...
7	NORTH C...	2017	September	Hail	WAYNE	2017-09-01 13:50...	2017-09-01 14:...
8	NORTH C...	2017	September	Thunderstorm Wind	RICHMOND	2017-09-01 13:35...	2017-09-01 13:...
9	NORTH C...	2017	September	Thunderstorm Wind	WAYNE	2017-09-01 14:10...	2017-09-01 14:...
10	NORTH C...	2017	September	Thunderstorm Wind	LEE	2017-09-01 14:52...	2017-09-01 14:...
11	NORTH C...	2017	September	Thunderstorm Wind	LEE	2017-09-01 15:00...	2017-09-01 15:...
12	TEXAS	2017	August	Tropical Storm	GALVESTON	2017-08-25 12:00...	2017-08-30 00:...
13	TEXAS	2017	August	Tropical Storm	SAN JACINTO	2017-08-25 12:00...	2017-08-30 00:...
14	NORTH C...	2017	September	Thunderstorm Wind	HARNETT	2017-09-01 15:45...	2017-09-01 15:...

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```
events = events(~ismissing(events.Property_Cost),:);
events = events(~ismissing(events.Crop_Cost),:);
most_ImpactedState_Harvey = groupsummary(events, "State", "max", "Total_Cost");
```

```
most_ImpactedState_Harvey = sortrows(most_ImpactedState_Harvey,'max_Total_Cost','descend')
```

most_ImpactedState_Harvey = 7×3 table

	State	GroupCount	max_Total_Cost
1	TEXAS	243	1.0000e+10
2	LOUISIANA	86	60000000
3	NORTH C...	48	10000000
4	KENTUCKY	17	350000
5	MISSISS...	39	200000
6	TENNESSEE	46	200000
7	ARKANSAS	53	20000

The two states most impacted by Harvey are **"TEXAS"** and **"LOUISIANA"**.

Table of Events for Two Most Impacted States

```
events_TEXAS_LOUISIANA = events(ismember(events.State,{'LOUISIANA','TEXAS'}),:)
```

events_TEXAS_LOUISIANA = 329×20 table

	State	Year	Month	Event_Type	CZ_Name	Begin_Date_Time	End_Date_Time
1	TEXAS	2017	August	Flash Flood	EL PASO	2017-08-23 16:15...	2017-08-23 17:...
2	TEXAS	2017	August	Thunderstorm Wind	EL PASO	2017-08-25 18:10...	2017-08-25 18:...
3	TEXAS	2017	August	Flash Flood	EL PASO	2017-08-25 18:48...	2017-08-25 20:...
4	TEXAS	2017	August	Flash Flood	HARDIN	2017-08-27 12:40...	2017-08-30 16:...
5	TEXAS	2017	August	Flash Flood	JASPER	2017-08-29 22:29...	2017-08-30 16:...
6	TEXAS	2017	August	Flash Flood	NEWTON	2017-08-29 22:29...	2017-08-30 16:...
7	TEXAS	2017	August	Flash Flood	FORT BEND	2017-08-26 00:45...	2017-08-26 02:...
8	TEXAS	2017	August	Thunderstorm Wind	BRISCOE	2017-08-20 17:45...	2017-08-20 17:...
9	TEXAS	2017	August	Thunderstorm Wind	JASPER	2017-08-30 22:45...	2017-08-30 22:...
10	TEXAS	2017	August	Flood	ORANGE	2017-08-30 16:00...	2017-08-31 23:...
11	TEXAS	2017	August	Flash Flood	MONTGOMERY	2017-08-26 08:00...	2017-08-26 11:...
12	TEXAS	2017	August	Flash Flood	JEFFERSON	2017-08-27 07:12...	2017-08-30 16:...
13	TEXAS	2017	August	Flash Flood	GALVESTON	2017-08-26 07:00...	2017-08-29 22:...
14	LOUISIANA	2017	August	Heat	CADDO	2017-08-19 09:00...	2017-08-20 18:...

```
events_TEXAS_LOUISIANA = events_TEXAS_LOUISIANA(~ismissing(events_TEXAS_LOUISIANA.Event_Type),
```

events_TEXAS_LOUISIANA = 329×20 table

	State	Year	Month	Event_Type	CZ_Name	Begin_Date_Time	End_Date_Time
1	TEXAS	2017	August	Flash Flood	EL PASO	2017-08-23 16:15...	2017-08-23 17:...
2	TEXAS	2017	August	Thunderstorm Wind	EL PASO	2017-08-25 18:10...	2017-08-25 18:...
3	TEXAS	2017	August	Flash Flood	EL PASO	2017-08-25 18:48...	2017-08-25 20:...
4	TEXAS	2017	August	Flash Flood	HARDIN	2017-08-27 12:40...	2017-08-30 16:...
5	TEXAS	2017	August	Flash Flood	JASPER	2017-08-29 22:29...	2017-08-30 16:...
6	TEXAS	2017	August	Flash Flood	NEWTON	2017-08-29 22:29...	2017-08-30 16:...
7	TEXAS	2017	August	Flash Flood	FORT BEND	2017-08-26 00:45...	2017-08-26 02:...
8	TEXAS	2017	August	Thunderstorm Wind	BRISCOE	2017-08-20 17:45...	2017-08-20 17:...
9	TEXAS	2017	August	Thunderstorm Wind	JASPER	2017-08-30 22:45...	2017-08-30 22:...
10	TEXAS	2017	August	Flood	ORANGE	2017-08-30 16:00...	2017-08-31 23:...
11	TEXAS	2017	August	Flash Flood	MONTGOMERY	2017-08-26 08:00...	2017-08-26 11:...
12	TEXAS	2017	August	Flash Flood	JEFFERSON	2017-08-27 07:12...	2017-08-30 16:...
13	TEXAS	2017	August	Flash Flood	GALVESTON	2017-08-26 07:00...	2017-08-29 22:...
14	LOUISIANA	2017	August	Heat	CADDO	2017-08-19 09:00...	2017-08-20 18:...

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Visualizations

Figure of Event Types

```
histogram(events_TEXAS_LOUISIANA.Event_Type, ["Flash Flood", "Flood", "Heat", "Storm Surge/Tide

title('Harvey Events VS Number of occurances')
xlabel('Harvey Events')
ylabel('Number of Occurances')
```
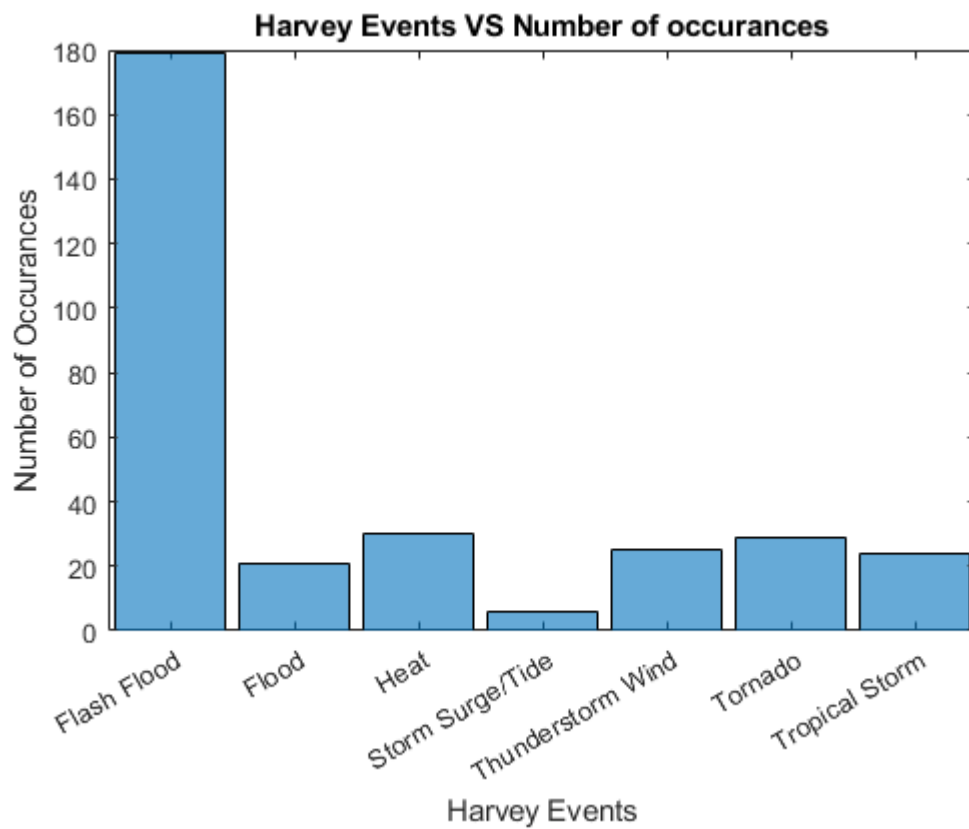
Harvey Events VS Number of occurances

Figure of Event Locations

```
geoscatter(events_TEXAS_LOUISIANA.Begin_Lat,events_TEXAS_LOUISIANA.Begin_Lon,events_TEXAS_LOUIS
colorbar
```

Analysis

Three Counties with Most Events in State 1 (TEXAS)

```
events_TEXAS = events_TEXAS_LOUISIANA(events_TEXAS_LOUISIANA.State == 'TEXAS',:);
events_LOUISIANA = events_TEXAS_LOUISIANA(events_TEXAS_LOUISIANA.State == 'LOUISIANA',:);

texas_Most_Counties = groupsummary(events_TEXAS, "CZ_Name");
texas_Most_Counties = sortrows(texas_Most_Counties,'GroupCount','descend')
```

texas_Most_Counties = 90×2 table

	CZ_Name	GroupCount
1	HARRIS	20
2	GALVESTON	15
3	ANGELINA	12
4	SABINE	12
5	FORT BEND	11
6	BASTROP	9
7	BRAZORIA	9
8	CALDWELL	7
9	CHAMBERS	7

	CZ_Name	GroupCount
10	JEFFERSON	5
11	MONTGOMERY	5
12	CALHOUN	4
13	FAYETTE	4
14	MATAGORDA	4

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Harris, Galveston, Angelina are the three counties with the most events in TEXAS.

Three Counties with Most Events in State 2 (LOUISIANA)

```
louisiana_Most_Counties = groupsummary(events_LOUISIANA, "CZ_Name");
louisiana_Most_Counties = sortrows(louisiana_Most_Counties,'GroupCount','descend')
```

louisiana_Most_Counties = 30×2 table

	CZ_Name	GroupCount
1	NATCHITOCHES	21
2	SABINE	15
3	RED RIVER	9
4	WINN	6
5	CAMERON	4
6	VERMILION	4
7	DE SOTO	3
8	UNION	2
9	ACADIA	1
10	BEAUREGARD	1
11	BIENVILLE	1
12	BOSSIER	1
13	CADDO	1
14	CALCASIEU	1

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Natchitoches, Sabine, and Red River are the three counties with the most events in LOUISIANA.

Three Counties with Highest Property Cost in State 1 (TEXAS)

```
texas_Highest_Prop_Cost = groupsummary(events_TEXAS, "CZ_Name", "max", "Property_Cost");
texas_Highest_Prop_Cost = sortrows(texas_Highest_Prop_Cost,'max_Property_Cost','descend')
```

`texas_Highest_Prop_Cost = `90×3 table

	CZ_Name	GroupCount	max_Property_Cost
1	GALVESTON	15	1.0000e+10
2	HARRIS	20	1.0000e+10
3	FORT BEND	11	8.0000e+09
4	MONTGOMERY	5	7.0000e+09
5	JEFFERSON	5	3.0000e+09
6	BRAZORIA	9	2.0000e+09
7	ORANGE	3	1.5000e+09
8	NUECES	1	1.0000e+09
9	HARDIN	1	600000000
10	WALKER	3	600000000
11	REFUGIO	3	500000000
12	SAN PATRI...	1	500000000
13	SAN JACINTO	2	350000000
14	POLK	1	300000000

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Galveston, Harris, and Fort Bend *are the three counties with highest property cost in TEXAS.*

Three Counties with Highest Property Cost in State 2 (LOUISIANA)

```
louisiana_Highest_Prop_Cost = groupsummary(events_LOUISIANA, "CZ_Name", "max", "Property_Cost")
louisiana_Highest_Prop_Cost = sortrows(louisiana_Highest_Prop_Cost,'max_Property_Cost','descend
```

`louisiana_Highest_Prop_Cost = `30×3 table

	CZ_Name	GroupCount	max_Property_Cost
1	CALCASIEU	1	60000000
2	BEAUREGARD	1	15000000
3	ACADIA	1	200000
4	CAMERON	4	50000
5	VERMILION	4	5000
6	BIENVILLE	1	0
7	BOSSIER	1	0
8	CADDO	1	0
9	CALDWELL	1	0
10	CLAIBORNE	1	0
11	DE SOTO	3	0

	CZ_Name	GroupCount	max_Property_Cost
12	EAST CAMERON	1	0
13	GRANT	1	0
14	IBERIA	1	0

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Calcasieu, Beauregard, and Acadia *are the three counties with highest property cost in LOUISIANA.*

Conclusions and Recommendation

According to the exploratory data analysis on the dataset STORMEVENTS_2017_FINALPROJECT, we can say that: -

1. Two states most impacted by Harvey Events were **TEXAS** and **LOUISIANA**.
2. According to the visualisation, **FLASH FLOODS** contributed the most to Harvey Events and **TEXAS** and **LOUISIANA** have seen a lot more events.
3. Three counties with the most events in Texas were **HARRIS, GALVESTON,** and **ANGELINA**.
4. Three counties with the most events in Louisiana were **NATCHITOCHES, SABINE,** and **RED RIVER**.
5. Three counties with the highest property cost in Texas were **GALVESTON, HARRIS,** and **FORT BEND**.
6. Three counties with the highest property cost in Louisiana were **CALCASIEU, BEAUREGARD,** and **ACADIA**.

I would like to *recommend* the management to send the contractors to **HARRIS, GALVESTON, FORT BEND** in a chronological order (top most priority to least most) to adjust the claims.