

Explore and Analyze Hurricane Harvey From 2017

This script explores the Hurricane Harvey events of 2017. The report focuses on the following states impacted by Harvey: **Arkansas, Kentucky, Louisiana, Mississippi, North Carolina, Tennessee, and Texas**. The report highlights the two most impacted state by Hurricane Harvey with table of events for each state from 17th of August to the 3rd of September. It also visualize the event type and location of events in the two states. It then analyze the three counties with most events and highest property damage cost in each state. Finally, it summarizes the data and

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Part 1: Background and Scope

Import the Data

The function ImportHarveyData imports the StormEvents_2017_finalProject file.

```
events=ImportHarveyData ("StormEvents_2017_finalProject.csv");
```

Two States Most Impacted by Harvey

Following code focuses on the following states impacted by Harvey: **Arkansas, Kentucky, Louisiana, Mississippi, North Carolina, Tennessee, and Texas**. The report highlights the two most impacted state by Hurricane Harvey from 17th of August to the 3rd of September.

```
Impacted_state= events(ismember(events.State,{'ARKANSAS','KENTUCKY','LOUISIANA','MISSISSIPPI'}));
Impacted_state.Begin_Date_Time=datetime(Impacted_state.Begin_Date_Time);
Impacted_state.End_Date_Time=datetime(Impacted_state.End_Date_Time);
Impacted_state_duration=Impacted_state(Impacted_state.Begin_Date_Time > '17-Aug-2017 00:00:00' & Impacted_state.End_Date_Time < '03-Sep-2017 00:00:00');
Impacted_state_duration.Property_Cost(ismissing(Impacted_state_duration.Property_Cost));
Most_Impacted=groupsummary(Impacted_state_duration,'State','sum','Property_Cost');
Most_Impacted= sortrows(Most_Impacted,'sum_Property_Cost','descend');
```

```
Most_Impacted=Most_Impacted(1:2,:)
```

Most_Impacted = 2×3 table

	State	GroupCount	sum_Propert...
1	TEXAS	272	7.7427e+10
2	LOUISIANA	85	75277000

Table of Events for Two Most Impacted States

The following code create the table of events for each state

```
Two_Most_Impacted_state=Impacted_state_duration(ismember(Impacted_state_duration.State,
```

Two_Most_Impacted_state = 357×24 table

...

	EpisodeID	Event_ID	State	Year	Month	Event_Type
1	119753	723472	TEXAS	2017	August	Tropical Storm
2	119753	723473	TEXAS	2017	August	Tropical Storm
3	119753	723449	TEXAS	2017	August	Tropical Storm
4	119753	723474	TEXAS	2017	August	Tropical Storm
5	119753	723475	TEXAS	2017	August	Tropical Storm
6	119753	723648	TEXAS	2017	August	Tropical Storm
7	120011	719146	TEXAS	2017	August	Flash Flood
8	120012	719147	TEXAS	2017	August	Thunderstor...
9	120012	719148	TEXAS	2017	August	Flash Flood
10	119746	719493	TEXAS	2017	August	Flash Flood
11	119746	719496	TEXAS	2017	August	Flash Flood
12	119746	719497	TEXAS	2017	August	Flash Flood
13	119753	720340	TEXAS	2017	August	Flash Flood
14	119826	718436	TEXAS	2017	August	Thunderstor...
15	117836	708282	TEXAS	2017	August	Thunderstor...
16	119746	719740	TEXAS	2017	August	Thunderstor...
17	119746	720010	TEXAS	2017	August	Flood
18	119753	720464	TEXAS	2017	August	Flash Flood
19	119853	718515	TEXAS	2017	August	Thunderstor...
20	119746	719342	TEXAS	2017	August	Flash Flood
21	119753	720344	TEXAS	2017	August	Flash Flood
22	117887	708470	LOUISIANA	2017	August	Heat
23	117887	708471	LOUISIANA	2017	August	Heat

	EpisodeID	Event_ID	State	Year	Month	Event_Type
24	117887	708472	LOUISIANA	2017	August	Heat
25	117887	708473	LOUISIANA	2017	August	Heat
26	118032	709519	TEXAS	2017	August	Thunderstor...
27	118916	714375	LOUISIANA	2017	August	Tropical Storm
28	118330	711050	TEXAS	2017	August	Flash Flood
29	118330	711054	TEXAS	2017	August	Flash Flood
30	118330	711059	TEXAS	2017	August	Flash Flood
31	118330	711060	TEXAS	2017	August	Flash Flood
32	119753	721087	TEXAS	2017	August	Flash Flood
33	119753	720859	TEXAS	2017	August	Flash Flood
34	117887	708474	LOUISIANA	2017	August	Heat
35	117887	708475	LOUISIANA	2017	August	Heat
36	117887	708477	LOUISIANA	2017	August	Heat
37	117887	708478	LOUISIANA	2017	August	Heat
38	117887	708479	LOUISIANA	2017	August	Heat
39	118032	709521	TEXAS	2017	August	Thunderstor...
40	118916	714376	LOUISIANA	2017	August	Tropical Storm
41	118916	714377	LOUISIANA	2017	August	Tropical Storm
42	118330	711063	TEXAS	2017	August	Flash Flood
43	118032	709520	TEXAS	2017	August	Flash Flood
44	118032	709525	TEXAS	2017	August	Thunderstor...
45	120132	719823	TEXAS	2017	August	Thunderstor...
46	119753	720465	TEXAS	2017	August	Flash Flood
47	117887	708480	LOUISIANA	2017	August	Heat
48	117887	708481	LOUISIANA	2017	August	Heat
49	117887	708482	LOUISIANA	2017	August	Heat
50	117887	708483	LOUISIANA	2017	August	Heat
51	117887	708484	LOUISIANA	2017	August	Heat
52	120318	720930	TEXAS	2017	August	Tropical Storm
53	118032	709522	TEXAS	2017	August	Flash Flood
54	118032	709523	TEXAS	2017	August	Thunderstor...
55	118032	711899	TEXAS	2017	August	Heavy Rain
56	118330	711072	TEXAS	2017	August	Flash Flood
57	118330	711078	TEXAS	2017	August	Flash Flood

	EpisodeID	Event_ID	State	Year	Month	Event_Type
58	118330	711079	TEXAS	2017	August	Flash Flood
59	118330	711081	TEXAS	2017	August	Flash Flood
60	118330	711083	TEXAS	2017	August	Flash Flood
61	118330	711089	TEXAS	2017	August	Flash Flood
62	118330	711090	TEXAS	2017	August	Flash Flood
63	118330	711092	TEXAS	2017	August	Flash Flood
64	118330	711405	TEXAS	2017	August	Flash Flood
65	118330	711407	TEXAS	2017	August	Flash Flood
66	118330	711408	TEXAS	2017	August	Flash Flood
67	118330	711409	TEXAS	2017	August	Flash Flood
68	118330	711412	TEXAS	2017	August	Flash Flood
69	119556	717411	TEXAS	2017	August	Hail
70	119753	720858	TEXAS	2017	August	Flash Flood
71	119753	720860	TEXAS	2017	August	Flash Flood
72	117887	708485	LOUISIANA	2017	August	Heat
73	117887	708486	LOUISIANA	2017	August	Heat
74	117887	708487	LOUISIANA	2017	August	Heat
75	117891	708498	TEXAS	2017	August	Heat
76	118330	711413	TEXAS	2017	August	Flash Flood
77	118330	711414	TEXAS	2017	August	Flash Flood
78	118330	711415	TEXAS	2017	August	Flash Flood
79	118386	711416	LOUISIANA	2017	August	Flash Flood
80	118386	711417	LOUISIANA	2017	August	Flash Flood
81	118386	711418	LOUISIANA	2017	August	Flash Flood
82	118386	711419	LOUISIANA	2017	August	Flash Flood
83	118386	711420	LOUISIANA	2017	August	Flash Flood
84	118386	711421	LOUISIANA	2017	August	Flash Flood
85	118386	711422	LOUISIANA	2017	August	Flash Flood
86	118386	711423	LOUISIANA	2017	August	Flash Flood
87	118386	711424	LOUISIANA	2017	August	Flash Flood
88	119556	717412	TEXAS	2017	August	Hail
89	119556	717413	TEXAS	2017	August	Thunderstor...
90	119565	717436	TEXAS	2017	August	Thunderstor...
91	119753	721098	TEXAS	2017	August	Flash Flood

	EpisodeID	Event_ID	State	Year	Month	Event_Type
92	117891	708499	TEXAS	2017	August	Heat
93	117891	708500	TEXAS	2017	August	Heat
94	117891	708501	TEXAS	2017	August	Heat
95	117891	708503	TEXAS	2017	August	Heat
96	118386	711425	LOUISIANA	2017	August	Flash Flood
97	118386	711426	LOUISIANA	2017	August	Flash Flood
98	118386	711427	LOUISIANA	2017	August	Flash Flood
99	118386	711428	LOUISIANA	2017	August	Flash Flood
100	118386	711429	LOUISIANA	2017	August	Flash Flood

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Part 2: Visualize the Locations of Hurricane Harvey

Figure of Event Types

Following code visualize the type and number of occurrences for events related to Harvey in the two states

```
Two_Most_Impacted_state.Event_Type= removecats(Two_Most_Impacted_state.Event_Type);
histogram(Two_Most_Impacted_state.Event_Type)
ylabel("Number of Occurrences")
title("Event Type in Texas and Louisiana")
```

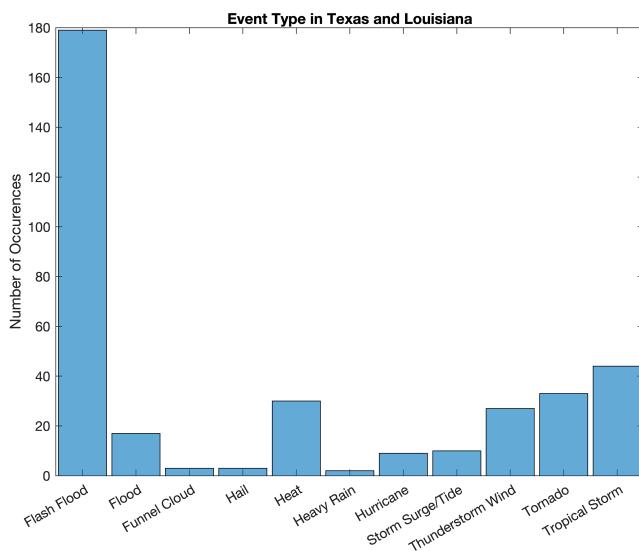
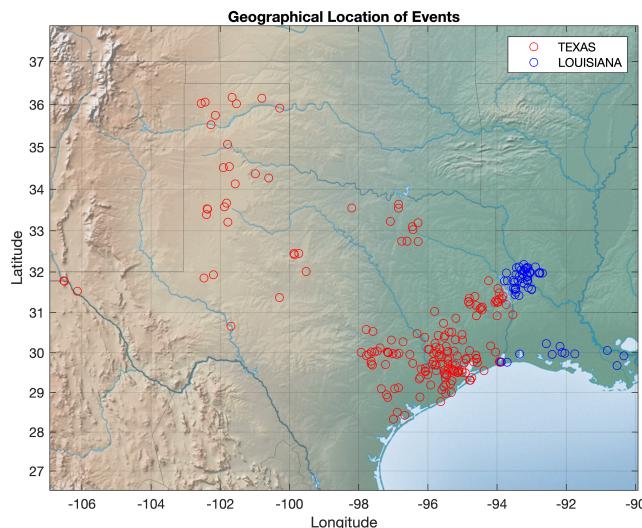


Figure of Event Locations

Following code visualize the location of events in the two states.

```
Two_Most_Impacted_state.Event_Type= removecats(Two_Most_Impacted_state.State);
events_TEXAS=Two_Most_Impacted_state(Two_Most_Impacted_state.State=='TEXAS',:);
events_LOUISIANA=Two_Most_Impacted_state(Two_Most_Impacted_state.State=='LOUISIANA',:);

geoscatte(events_TEXAS.Begin_Lat,events_TEXAS.Begin_Lon,36,'red');
hold on
geoscatte(events_LOUISIANA.Begin_Lat,events_LOUISIANA.Begin_Lon,36,'blue');
geobasemap('colorterrain')
legend({'TEXAS','LOUISIANA'})
title ("Geographical Location of Events")
```



Part 3: Analysis

Three Counties with Most Events in State 1

The following code show in a table the three counties with the most events in state 1.

```
Events_counties=groupsummary(events_TEXAS,'CZ_Name');
Events_counties=sortrows(Events_counties,'GroupCount','descend');
Events_counties=Events_counties(1:3,:)
```

	CZ_Name	GroupCount
1	HARRIS	21
2	GALVESTON	17
3	FORT BEND	13

Three Counties with Most Events in State 2

The following code show in a table the three counties with the most events in state 2.

```
Events_counties=groupsummary(events_LOUISIANA,'CZ_Name');
Events_counties=sortrows(Events_counties,'GroupCount','descend');
Events_counties=Events_counties(1:3,:)
```

Events_counties = 3x2 table

	CZ_Name	GroupCount
1	NATCHITOCHES	21
2	SABINE	15
3	RED RIVER	9

Three Counties with Highest Property Cost in State 1

The following code show in a table the three counties with highest total property cost in state 1 with dollar amount in column 3.

```
events_TEXAS.Property_Cost(ismissing(events_TEXAS.Property_Cost)) = 0;
%events_TEXAS.Damage_Property(ismissing(events_TEXAS.Damage_Property)) = 0;
%events_TEXAS.Damage_Crops(ismissing(events_TEXAS.Damage_Crops)) = 0;
%events_TEXAS.Total_Damage_Cost=events_TEXAS.Damage_Property+events_TEXAS.Damage_Crops;
Events_Property_counties=groupsummary(events_TEXAS,'CZ_Name','sum','Property_Cost');
Events_Property_counties=sortrows(Events_Property_counties,'sum_Property_Cost','descend');
Events_counties=Events_Property_counties(1:3,1:2:3);
Events_counties.Properties.VariableNames([1 2])= {'Counties' 'Total_Property_Cost_Dollars'}
```

Events_counties = 3x2 table

	Counties	Total_Prope...
1	GALVESTON	2.0000e+10
2	FORT BEND	1.6004e+10
3	MONTGOMERY	1.4000e+10

Three Counties with Highest Property Cost in State 2

The following code show in a table the three counties with highest total property cost in state 2 with dollar amount in column 3.

```
events_LOUISIANA.Property_Cost(ismissing(events_LOUISIANA.Property_Cost)) = 0;
%events_LOUISIANA.Property_Cost(ismissing(events_LOUISIANA.Property_Cost)) = 0;
%events_LOUISIANA.Damage_Crops(ismissing(events_LOUISIANA.Damage_Crops)) = 0;
%events_LOUISIANA.Total_Damage_Cost=events_LOUISIANA.Damage_Property+events_LOUISIANA.Damage_Crops;
Events_Property_counties=groupsummary(events_LOUISIANA,'CZ_Name','sum','Property_Cost');
Events_Property_counties=sortrows(Events_Property_counties,'sum_Property_Cost','descend');
Events_counties=Events_Property_counties(1:3,1:2:3);
Events_counties.Properties.VariableNames([1 2])= {'Counties' 'Total_Property_Cost_Dollars'}
```

```
Events_counties = 3x2 table
```

	Counties	Total_Prope...
1	CALCASIEU	60000000
2	BEAUREGARD	15000000
3	ACADIA	200000

Part 4: Conclusions and Recommendations

Based on the analysis of storm event data of 2017, the two states which are most affected by Hurricane Harvey from 17th of August to 3rd September are Texas and Louisiana. The event type and location of events are shown in Visualization section. In Texas, the three counties with most events are Harris, Galveston and Fort Bend and the three counties with highest property damage are Fort Bend, Walker and Waller as shown in analysis section. In Louisiana, the three counties with most events are Natchitoches, Sabine and Red River and the three counties with highest property damage are Acadia, Cameron and Calcasieu.