My report on the impact of Harvey

Introduction

The porpuse of this report is to analize the impact of Hurricane Harvey, which arrived in the US in 2017. This hurricane was one of the most catastrophic hurricanes ever happened and it affected the US with a total cost of approximately $125 billion.. The most dangerous days were between August 24 and August 26, although effects and damages, both direct and indirect, were reported both before and after these days. In this report I will focus on the most severly hit countries during the period between the 17th of August and the 3rd of September.

I will start with an analysis of the data and after that I'll draw my conclusions. The main goal is to identify the most severely damaged and risky counties to point to an insurance company the areas to focuse on.

The report will be structured like this:

Background and Scope

Import the Data

Let's start by importing the data.

```
events = importstorms2017('StormEvents_2017_finalProject.csv');
```

Let's immediately filter the data for the period we want to focus on:

```
events = events(events.Begin_Date_Time>'2017-08-16' & events.End_Date_Time<'2017-09-04', :);
```

From some prior analysis, I discovered the 7 most impacted states, and therefore another filtering of the data:

```
events = events(ismember(events.State,{'ARKANSAS','KENTUCKY','LOUISIANA','MISSISSIPPI','NORTH C
```

The most affected state were:

- Arkansas
- Kentucky
- Louisiana
- Mississippi
- North Carolina
- Tennesse
- Texas

I decided to always rewrite the variable 'events' because it's the only data set I will focus on.

Two States Most Impacted by Harvey

I would now want to highlight the two most impacted states in terms of total property cost:

```
sumtotalcost=groupsummary(events, 'State', 'sum', 'Property_Cost');
sumtotalcost=sortrows(sumtotalcost,'sum_Property_Cost','descend')
```

sumtotalcost = 7×3 table

	State	GroupCount	sum_Property_Cost
1	TEXAS	279	7.7427e+10
2	LOUISIANA	85	75277000
3	NORTH C...	59	12338500
4	MISSISS...	42	928000
5	TENNESSEE	46	504000
6	KENTUCKY	20	435000
7	ARKANSAS	53	61000

I used a groupsummary function to order the data as I wished.

We can easily see that Texas was the most affected State, and Louisiana the second.

Table of Events for Two Most Impacted States

Let's give a look at which types of events affected these two States, after having excluded the non storm-related events:

```
eventsofstates=events(events.State=='TEXAS' | events.State=='LOUISIANA', :);
eventsofstates.Event_Type = removecats(eventsofstates.Event_Type,{'Astronomical Low Tide','Aval
headofstates=head(eventsofstates)
```

headofstates = 8×24 table

...

	EpisodeID	Event_ID	State	Year	Month	Event_Type	CZ_Name
1	119753	723472	TEXAS	2017	August	Tropical Storm	MONTGOM...
2	119753	723473	TEXAS	2017	August	Tropical Storm	FORT BEND
3	119753	723449	TEXAS	2017	August	Tropical Storm	GALVESTON
4	119753	723474	TEXAS	2017	August	Tropical Storm	SAN JAC...
5	119753	723475	TEXAS	2017	August	Tropical Storm	WALKER
6	119753	723648	TEXAS	2017	August	Tropical Storm	POLK
7	120011	719146	TEXAS	2017	August	Flash Flood	EL PASO
8	120012	719147	TEXAS	2017	August	Thunderstorm...	EL PASO

Visualizations

Figure of Event Types

Here you can find an histogram to rapidly visualize which types of events occurred the most during the period of the hurrciane in the two most damaged states.

```
figureone = groupsummary(eventsofstates, 'Event_Type');
figure;bar(figureone.Event_Type,figureone.GroupCount,'DisplayName','figureone.GroupCount');
xlabel('Type of Event')
ylabel('Number of times accured')
title('Events in Texas and Louisiana')
```

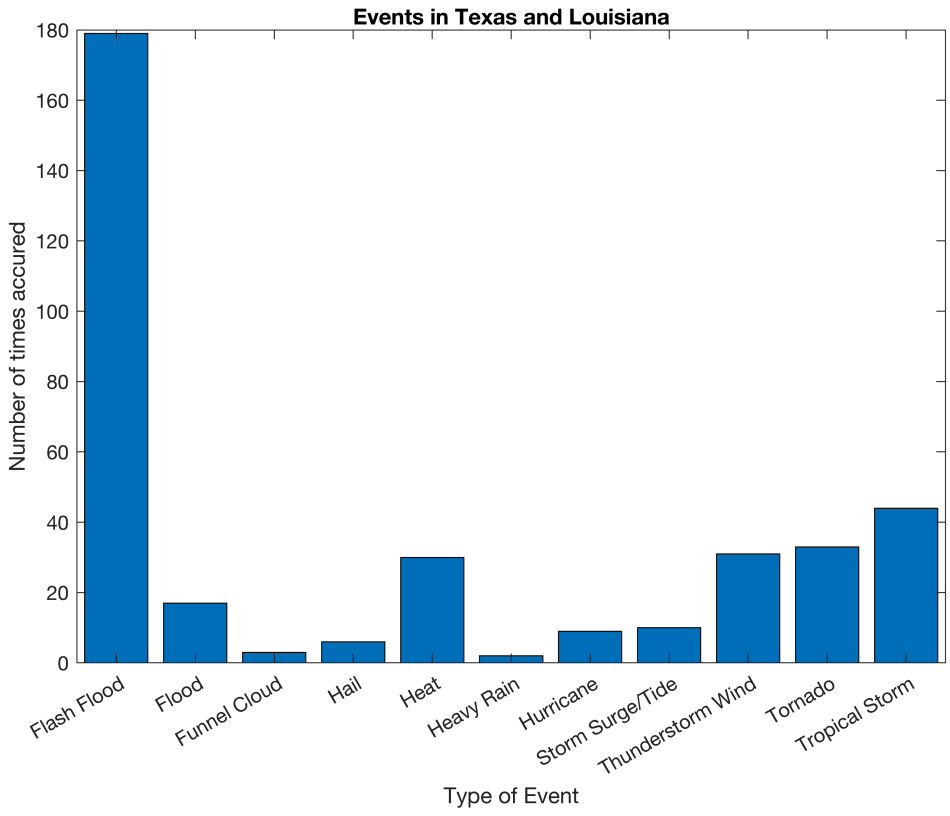
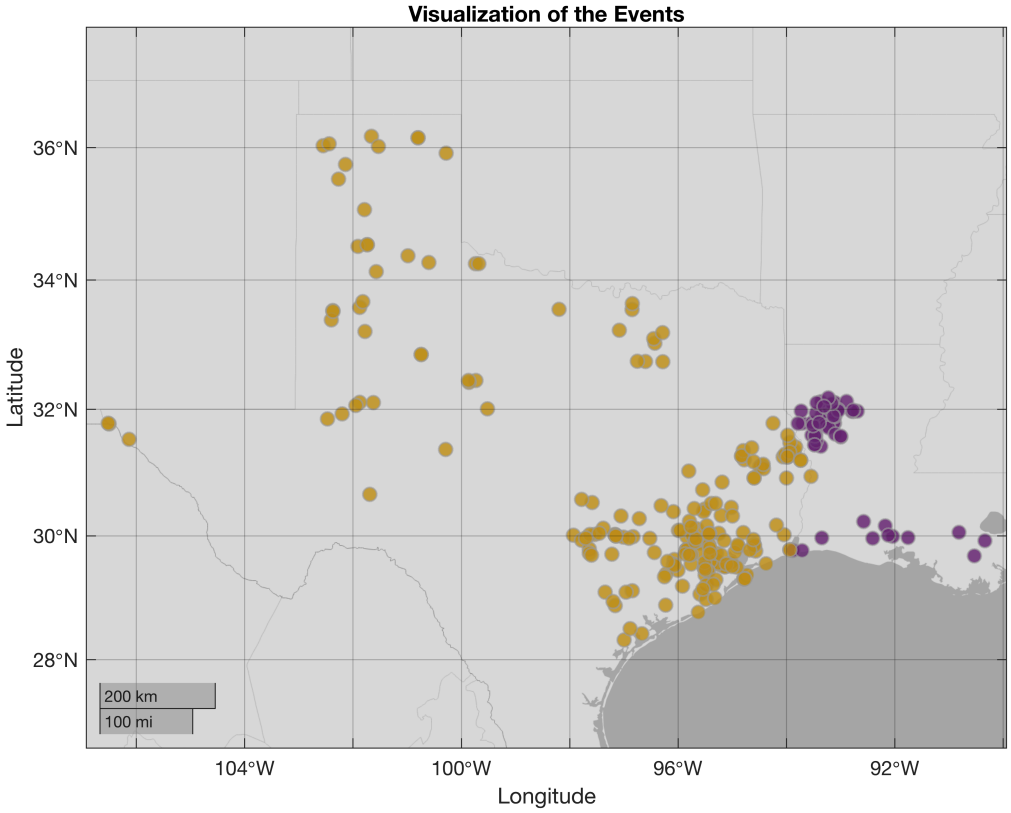


Figure of Event Locations

We can also visualize a geobubble graph, which provides a fast visualization of where exactly the events took place.

```
geo=geobubble(eventsofstates.Begin_Lat,eventsofstates.Begin_Lon,[],eventsofstates.State);
title('Visualization of the Events')
```



We can observe that most of the events happened in the southern part of Texas, and near the south-eastern border with Louisiana. We can conclude the this region was the most affected by the hurricane.

Analysis

Let's visualize which were the three counties with more events in each of the two states.

The code will be very similar for the two states: first I'll 'groupsummary' the types of events per single state and then I'll search for the most frequent events.

Three Counties with Most Events in Texas

```
eventstexas=eventsofstates(eventsofstates.State=='TEXAS',:);
groupsummary(eventstexas, 'CZ_Name');
maxtexas = sortrows(ans,'GroupCount','descend');
head(maxtexas)
```

ans = 8×2 table

	CZ_Name	GroupCount
1	HARRIS	21
2	GALVESTON	17
3	FORT BEND	13
4	ANGELINA	12
5	BRAZORIA	12

	CZ_Name	GroupCount
6	SABINE	12
7	BASTROP	9
8	CHAMBERS	8

We can see that the three most damaged counties in Texas were:

1. Harris
2. Galveston
3. Fort Bend

Three Counties with Most Events in Louisiana

```
eventslouis=eventsofstates(eventsofstates.State=='LOUISIANA',:);
groupsummary(eventslouis, 'CZ_Name');
maxlouis = sortrows(ans,'GroupCount','descend');
head(maxlouis)
```

ans = 8×2 table

	CZ_Name	GroupCount
1	NATCHIT...	21
2	SABINE	15
3	RED RIVER	9
4	WINN	6
5	VERMILION	4
6	CAMERON	3
7	DE SOTO	3
8	UNION	2

We can see that the three most damaged counties in Texas were:

1. Natchitoches
2. Sabine
3. Red River

Three Counties with Highest Property Cost in State 1

Let's now look for the counties with the highest total property cost.

```
groupsummary(eventstexas,'CZ_Name', 'sum', 'Property_Cost');
maxtexas2 = sortrows(ans,'sum_Property_Cost','descend');
head(maxtexas2)
```

ans = 8×3 table

	CZ_Name	GroupCount	sum_Property_Cost
1	GALVESTON	17	2.0000e+10
2	FORT BEND	13	1.6004e+10
3	MONTGOM...	6	1.4000e+10
4	HARRIS	21	1.0001e+10
5	JEFFERSON	4	3.0000e+09
6	BRAZORIA	12	2.0008e+09
7	ARANSAS	2	1.9500e+09
8	ORANGE	2	1.5000e+09

We can see that the three counties with the highest total property cost in Texas were:

1. Galvestone
2. Fort Bend
3. Montgomery

Three Counties with Highest Property Cost in State 2

```
groupsummary(eventslouis,'CZ_Name', 'sum', 'Property_Cost');
maxlouis2= sortrows(ans,'sum_Property_Cost','descend');
head(maxlouis2)
```

ans = 8×3 table

	CZ_Name	GroupCount	sum_Property_Cost
1	CALCASIEU	1	60000000
2	BEAUREG...	1	15000000
3	ACADIA	1	200000
4	CAMERON	3	72000
5	VERMILION	4	5000
6	BIENVILLE	1	0
7	BOSSIER	1	0
8	CADDO	1	0

We can see that the three counties with the highest total property cost in Texas were:

1. Calcasieu
2. Beauregard
3. Acadia

Conclusions and Recommendations

Now that I have analyzed all the data, I can draw my conclusions. It's clear that the two most affected states were Texas and Lousiana. Looking at the counties we can provide some precious information to the insurance

company. As a genereal rule, I would suggest focusing on the counties with the highest total property cost, which you can easly see in the last two charts. In terms of single counties I would suggest:

- Texas, which was the most damaged state, had a total of $ 77 427 000 000 in damaged property. Two of the most severly hit counties, Galveston and Fort Bend, also had two of the highest total property cost. I would definitely recommend the insurance company to focus on these two counties.
- On the other hand, we can't see a strong correlation between the most impacted counties and the highest total property cost per county in Louisiana. The only county which appears in both charts in a high position is Vermilion, but having a total damage of only $ 5 000 I would suggest to focus on more damaged counties, such as Calcasieu and Beauregard, which had less single events, but more damage in terms of total property cost.