Allocating Resources After a Major Weather Event

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# Background and Scope

## Import the Data

To import the required file in the MATLAB workspace:

1. Double-click the file through your matlab window only, to import it, in our case it is (.csv) type file.
2. While we are working on (.csv) type file we can import the perticular column in our script, or we can import the file as it is.
3. After this we are all set to analyse our data.

## Two States Most Impacted by Harvey

To filter out the Harvey related events we created a variable ***HarveyRelatedEvents*** containing the data of events occured from "17th of Aug" to "3rd of Sept", by this we have successfully filtered out the duration of events in which the Harvey occured.

To filter the data for more accurate assumption we have filtered the state where Harvey occured and stored that in the variable ***HarveyEvents***. After this filtering we also removed the state with undefined entries in tthe ***HarveyEvents***.

Now to extract the state name from the table I first use the groupsummary() function to and then sort the table with respect to GroupCount in descending order. Then created two variables named state1 and state2 to store the first two values of the sorted data.

HarveyRelatedEvents = StormEvents2017finalProject(StormEvents2017finalProject.Begin\_Date\_Time >= '2017-08-17 00:00:00' & StormEvents2017finalProject.Begin\_Date\_Time < '2017-09-03 23:23:01',:);

HarveyEvents = HarveyRelatedEvents(ismember(HarveyRelatedEvents.State,{'ARKANSAS','KENTUCKY','LOUISIANA','MISSISSIPPI','NORTH CAROLINA','TENNESSEE','TEXAS'}),:);

HarveyEvents = HarveyEvents(~ismissing(HarveyEvents.State),:);

HarveyState = groupsummary(HarveyEvents,'State');

HarveyState = sortrows(HarveyState,'GroupCount','descend');

State1 = HarveyState.State(1)

State1 = *categorical*

TEXAS

State2 = HarveyState.State(2)

State2 = *categorical*

LOUISIANA

From the observation it is clearly visible the two states which have most impact of Harvey are ***TEXAS*** and **LOUISIANA**

## Table of Events for Two Most Impacted States

I named a variable ***EventsOnMostImpactedState*** to store a table containing information about the two states which are heavily affected by the Harvey, I filtered the categorical variable state by applying conditional operation. The other useless categories of variable state were removed by the function ***removecats()*** and obverted on the same table variable ***EventsOnMostImpactedState***

EventsOnMostImpactedState = HarveyEvents(HarveyEvents.State == State1 | HarveyEvents.State == State2,:);

EventsOnMostImpactedState.State = removecats(EventsOnMostImpactedState.State);

EventsOnMostImpactedState.Event\_Type = removecats(EventsOnMostImpactedState.Event\_Type)

EventsOnMostImpactedState = 361×9 table

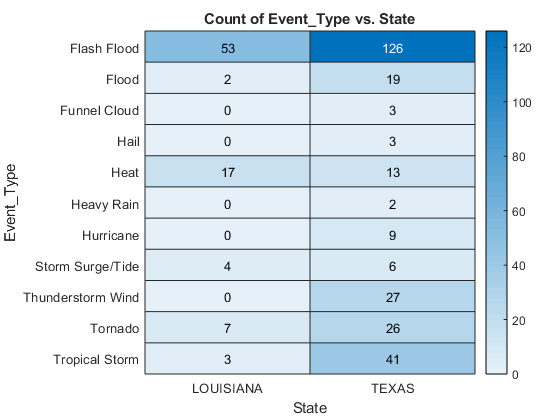
|  | **State** | **Event\_Type** | **CZ\_Name** | **Begin\_Date\_Time** | **End\_Date\_Time** | **⋯** |
| --- | --- | --- | --- | --- | --- | --- |
| **1** | TEXAS | Tropical Storm | MONTGOMERY | 2017-08-25 12:00:00 | 2017-08-30 00:00:00 |  |
| **2** | TEXAS | Tropical Storm | FORT BEND | 2017-08-26 00:00:00 | 2017-08-30 00:00:00 |  |
| **3** | TEXAS | Tropical Storm | GALVESTON | 2017-08-25 12:00:00 | 2017-08-30 00:00:00 |  |
| **4** | TEXAS | Tropical Storm | SAN JACINTO | 2017-08-25 12:00:00 | 2017-08-30 00:00:00 |  |
| **5** | TEXAS | Tropical Storm | WALKER | 2017-08-25 12:00:00 | 2017-08-30 00:00:00 |  |
| **6** | TEXAS | Tropical Storm | POLK | 2017-08-25 12:00:00 | 2017-08-30 00:00:00 |  |
| **7** | TEXAS | Flash Flood | EL PASO | 2017-08-23 16:15:00 | 2017-08-23 17:15:00 |  |
| **8** | TEXAS | Thunderstorm Wind | EL PASO | 2017-08-25 18:10:00 | 2017-08-25 18:10:00 |  |
| **9** | TEXAS | Flash Flood | EL PASO | 2017-08-25 18:48:00 | 2017-08-25 20:00:00 |  |
| **10** | TEXAS | Flash Flood | HARDIN | 2017-08-27 12:40:00 | 2017-08-30 16:00:00 |  |
| **11** | TEXAS | Flash Flood | JASPER | 2017-08-29 22:29:00 | 2017-08-30 16:00:00 |  |
| **12** | TEXAS | Flash Flood | NEWTON | 2017-08-29 22:29:00 | 2017-08-30 16:00:00 |  |
| **13** | TEXAS | Flash Flood | FORT BEND | 2017-08-26 00:45:00 | 2017-08-26 02:15:00 |  |
| **14** | TEXAS | Thunderstorm Wind | MIDLAND | 2017-08-22 20:59:00 | 2017-08-22 20:59:00 |  |
| **15** | TEXAS | Thunderstorm Wind | BRISCOE | 2017-08-20 17:45:00 | 2017-08-20 17:45:00 |  |
| **16** | TEXAS | Thunderstorm Wind | JASPER | 2017-08-30 22:45:00 | 2017-08-30 22:45:00 |  |
| **17** | TEXAS | Flood | ORANGE | 2017-08-30 16:00:00 | 2017-08-31 23:59:00 |  |
| **18** | TEXAS | Flash Flood | MONTGOMERY | 2017-08-26 08:00:00 | 2017-08-26 11:00:00 |  |
| **19** | TEXAS | Thunderstorm Wind | ECTOR | 2017-08-25 17:20:00 | 2017-08-25 17:21:00 |  |
| **20** | TEXAS | Flash Flood | JEFFERSON | 2017-08-27 07:12:00 | 2017-08-30 16:00:00 |  |
| **21** | TEXAS | Flash Flood | GALVESTON | 2017-08-26 07:00:00 | 2017-08-29 22:59:00 |  |
| **22** | LOUISIANA | Heat | CADDO | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **23** | LOUISIANA | Heat | BOSSIER | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **24** | LOUISIANA | Heat | DE SOTO | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **25** | LOUISIANA | Heat | RED RIVER | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **26** | TEXAS | Thunderstorm Wind | SWISHER | 2017-08-22 16:05:00 | 2017-08-22 16:05:00 |  |
| **27** | LOUISIANA | Tropical Storm | SABINE | 2017-08-30 16:45:00 | 2017-08-30 22:30:00 |  |
| **28** | TEXAS | Flash Flood | ANGELINA | 2017-08-30 17:00:00 | 2017-08-30 19:00:00 |  |
| **29** | TEXAS | Flash Flood | ANGELINA | 2017-08-29 17:02:00 | 2017-08-29 21:00:00 |  |
| **30** | TEXAS | Flash Flood | ANGELINA | 2017-08-29 01:45:00 | 2017-08-29 19:45:00 |  |
| **31** | TEXAS | Flash Flood | ANGELINA | 2017-08-29 01:50:00 | 2017-08-29 19:45:00 |  |
| **32** | TEXAS | Flash Flood | SAN JACINTO | 2017-08-27 13:00:00 | 2017-08-28 03:15:00 |  |
| **33** | TEXAS | Flash Flood | GALVESTON | 2017-08-26 20:45:00 | 2017-08-29 20:45:00 |  |
| **34** | LOUISIANA | Heat | BIENVILLE | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **35** | LOUISIANA | Heat | WEBSTER | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **36** | LOUISIANA | Heat | CLAIBORNE | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **37** | LOUISIANA | Heat | LINCOLN | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **38** | LOUISIANA | Heat | JACKSON | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **39** | TEXAS | Thunderstorm Wind | LUBBOCK | 2017-08-22 18:00:00 | 2017-08-22 18:00:00 |  |
| **40** | LOUISIANA | Tropical Storm | NATCHITOCHES | 2017-08-30 16:45:00 | 2017-08-30 22:30:00 |  |
| **41** | LOUISIANA | Tropical Storm | UNION | 2017-08-30 16:45:00 | 2017-08-30 22:30:00 |  |
| **42** | TEXAS | Flash Flood | ANGELINA | 2017-08-29 05:40:00 | 2017-08-29 17:45:00 |  |
| **43** | TEXAS | Flash Flood | SWISHER | 2017-08-22 16:15:00 | 2017-08-22 18:00:00 |  |
| **44** | TEXAS | Thunderstorm Wind | HOCKLEY | 2017-08-22 17:45:00 | 2017-08-22 17:45:00 |  |
| **45** | TEXAS | Thunderstorm Wind | CLAY | 2017-08-19 15:15:00 | 2017-08-19 15:15:00 |  |
| **46** | TEXAS | Flash Flood | GALVESTON | 2017-08-26 10:00:00 | 2017-08-26 13:00:00 |  |
| **47** | LOUISIANA | Heat | UNION | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **48** | LOUISIANA | Heat | OUACHITA | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **49** | LOUISIANA | Heat | CALDWELL | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **50** | LOUISIANA | Heat | WINN | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **51** | LOUISIANA | Heat | LA SALLE | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **52** | TEXAS | Tropical Storm | KENEDY | 2017-08-25 12:00:00 | 2017-08-25 20:30:00 |  |
| **53** | TEXAS | Flash Flood | HOCKLEY | 2017-08-22 18:14:00 | 2017-08-22 18:45:00 |  |
| **54** | TEXAS | Thunderstorm Wind | LYNN | 2017-08-22 18:27:00 | 2017-08-22 18:34:00 |  |
| **55** | TEXAS | Heavy Rain | HOCKLEY | 2017-08-22 17:30:00 | 2017-08-22 17:55:00 |  |
| **56** | TEXAS | Flash Flood | SABINE | 2017-08-30 12:05:00 | 2017-08-31 02:45:00 |  |
| **57** | TEXAS | Flash Flood | SAN AUGUSTINE | 2017-08-30 12:12:00 | 2017-08-31 02:45:00 |  |
| **58** | TEXAS | Flash Flood | SABINE | 2017-08-30 13:01:00 | 2017-08-31 02:45:00 |  |
| **59** | TEXAS | Flash Flood | SABINE | 2017-08-30 14:09:00 | 2017-08-31 02:45:00 |  |
| **60** | TEXAS | Flash Flood | ANGELINA | 2017-08-30 15:38:00 | 2017-08-30 19:00:00 |  |
| **61** | TEXAS | Flash Flood | ANGELINA | 2017-08-30 18:42:00 | 2017-08-30 19:00:00 |  |
| **62** | TEXAS | Flash Flood | ANGELINA | 2017-08-30 18:42:00 | 2017-08-30 19:00:00 |  |
| **63** | TEXAS | Flash Flood | SABINE | 2017-08-30 18:42:00 | 2017-08-31 02:45:00 |  |
| **64** | TEXAS | Flash Flood | SABINE | 2017-08-30 18:42:00 | 2017-08-31 02:45:00 |  |
| **65** | TEXAS | Flash Flood | SABINE | 2017-08-30 18:42:00 | 2017-08-31 02:45:00 |  |
| **66** | TEXAS | Flash Flood | SABINE | 2017-08-30 18:42:00 | 2017-08-31 02:45:00 |  |
| **67** | TEXAS | Flash Flood | SABINE | 2017-08-30 18:42:00 | 2017-08-31 02:45:00 |  |
| **68** | TEXAS | Flash Flood | ANGELINA | 2017-08-30 17:00:00 | 2017-08-30 19:00:00 |  |
| **69** | TEXAS | Hail | SHERMAN | 2017-08-17 17:27:00 | 2017-08-17 17:27:00 |  |
| **70** | TEXAS | Flash Flood | HARRIS | 2017-08-26 20:15:00 | 2017-08-29 20:15:00 |  |
| **71** | TEXAS | Flash Flood | HARRIS | 2017-08-26 20:30:00 | 2017-08-29 20:30:00 |  |
| **72** | LOUISIANA | Heat | GRANT | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **73** | LOUISIANA | Heat | NATCHITOCHES | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **74** | LOUISIANA | Heat | SABINE | 2017-08-19 09:00:00 | 2017-08-20 18:00:00 |  |
| **75** | TEXAS | Heat | CASS | 2017-08-19 20:32:00 | 2017-08-20 18:00:00 |  |
| **76** | TEXAS | Flash Flood | SHELBY | 2017-08-30 21:28:00 | 2017-08-31 02:45:00 |  |
| **77** | TEXAS | Flash Flood | SHELBY | 2017-08-30 21:30:00 | 2017-08-31 02:45:00 |  |
| **78** | TEXAS | Flash Flood | SABINE | 2017-08-30 12:11:00 | 2017-08-31 02:45:00 |  |
| **79** | LOUISIANA | Flash Flood | SABINE | 2017-08-30 11:56:00 | 2017-08-31 07:00:00 |  |
| **80** | LOUISIANA | Flash Flood | SABINE | 2017-08-30 12:00:00 | 2017-08-31 07:00:00 |  |
| **81** | LOUISIANA | Flash Flood | SABINE | 2017-08-30 12:59:00 | 2017-08-31 07:00:00 |  |
| **82** | LOUISIANA | Flash Flood | RED RIVER | 2017-08-30 12:59:00 | 2017-08-31 07:00:00 |  |
| **83** | LOUISIANA | Flash Flood | SABINE | 2017-08-30 12:59:00 | 2017-08-31 07:00:00 |  |
| **84** | LOUISIANA | Flash Flood | RED RIVER | 2017-08-30 13:00:00 | 2017-08-31 07:00:00 |  |
| **85** | LOUISIANA | Flash Flood | SABINE | 2017-08-30 13:17:00 | 2017-08-31 07:00:00 |  |
| **86** | LOUISIANA | Flash Flood | NATCHITOCHES | 2017-08-30 13:20:00 | 2017-08-31 07:00:00 |  |
| **87** | LOUISIANA | Flash Flood | NATCHITOCHES | 2017-08-30 13:23:00 | 2017-08-31 07:00:00 |  |
| **88** | TEXAS | Hail | HUTCHINSON | 2017-08-17 18:35:00 | 2017-08-17 18:35:00 |  |
| **89** | TEXAS | Thunderstorm Wind | RANDALL | 2017-08-17 18:59:00 | 2017-08-17 18:59:00 |  |
| **90** | TEXAS | Thunderstorm Wind | HARTLEY | 2017-08-27 20:27:00 | 2017-08-27 20:27:00 |  |
| **91** | TEXAS | Flash Flood | AUSTIN | 2017-08-28 03:30:00 | 2017-08-28 06:15:00 |  |
| **92** | TEXAS | Heat | MARION | 2017-08-19 20:32:00 | 2017-08-20 18:00:00 |  |
| **93** | TEXAS | Heat | HARRISON | 2017-08-19 20:32:00 | 2017-08-20 18:00:00 |  |
| **94** | TEXAS | Heat | GREGG | 2017-08-19 20:32:00 | 2017-08-20 18:00:00 |  |
| **95** | TEXAS | Heat | RUSK | 2017-08-19 20:32:00 | 2017-08-20 18:00:00 |  |
| **96** | LOUISIANA | Flash Flood | SABINE | 2017-08-30 14:00:00 | 2017-08-31 07:00:00 |  |
| **97** | LOUISIANA | Flash Flood | SABINE | 2017-08-30 14:20:00 | 2017-08-31 07:00:00 |  |
| **98** | LOUISIANA | Flash Flood | NATCHITOCHES | 2017-08-30 14:28:00 | 2017-08-31 07:00:00 |  |
| **99** | LOUISIANA | Flash Flood | NATCHITOCHES | 2017-08-30 15:00:00 | 2017-08-31 07:00:00 |  |
| **100** | LOUISIANA | Flash Flood | SABINE | 2017-08-30 15:01:00 | 2017-08-31 07:00:00 |  |
| **⋮** |  |  |  |  |  |  |

# Visualizations

## Figure of Event Types

I used the heat map function to generate a figure of events perfectly explaining the data and giving a clear idea about the states affected by the harvey.

heatmap(EventsOnMostImpactedState,'State','Event\_Type')



ans =

HeatmapChart (Count of Event\\_Type vs. State) with properties:

SourceTable: [361×9 table]

XVariable: 'State'

YVariable: 'Event\_Type'

ColorVariable: ''

ColorMethod: 'count'

Show all properties

## Figure of Event Locations

To show the location of the events, I first created two different variables to differentiate the Longitude and latitude of the states. Then used the geoscatter plot to plot the locations, now to plot them with different colour I used hold function to do this.

TEvent = EventsOnMostImpactedState.State == "TEXAS";

geoscatter(EventsOnMostImpactedState.Begin\_Lat(TEvent),EventsOnMostImpactedState.Begin\_Lon(TEvent))

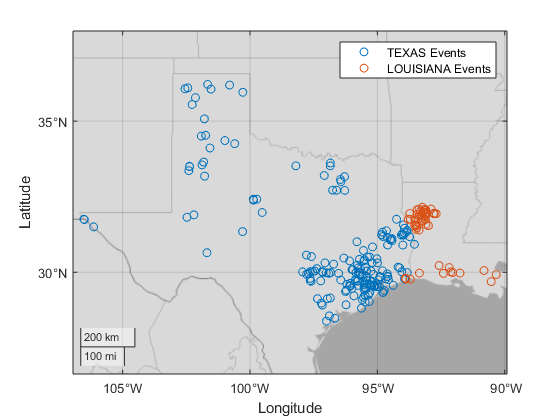
hold on

LEvent = EventsOnMostImpactedState.State == "LOUISIANA";

geoscatter(EventsOnMostImpactedState.Begin\_Lat(LEvent),EventsOnMostImpactedState.Begin\_Lon(LEvent))

legend({'TEXAS Events','LOUISIANA Events'})

hold off



# Analysis

## Three Counties with Most Events in TEXAS

The blow code creates a table containing the name of the top three counties in state 1 with the most events in the descending order.

CountiesState1 = EventsOnMostImpactedState(EventsOnMostImpactedState.State == State1,:);

Counties = groupsummary(CountiesState1,"CZ\_Name");

Counties = sortrows(Counties,'GroupCount','descend');

Counties([1,2,3],:)

ans = 3×2 table

|  | **CZ\_Name** | **GroupCount** |
| --- | --- | --- |
| **1** | HARRIS | 21 |
| **2** | GALVESTON | 17 |
| **3** | FORT BEND | 13 |

The analysis of the Texas’s counties data tells that the top three counties from ***TEXAS*** ***are*** ***HARRIS with 21 Events, GALVESTON with 17 Events and FORT BEND with 13 Events,*** are recorded as the top three counties with most event reported.

## Three Counties with Most Events in LOUISIANA

The blow code creates a table contaning the name of the top three counties in state 2 with the most events in the descending order.

CountiesState2 = EventsOnMostImpactedState(EventsOnMostImpactedState.State == State2,:);

Counties2 = groupsummary(CountiesState2,"CZ\_Name");

Counties2 = sortrows(Counties2,'GroupCount','descend');

Counties2([1,2,3],:)

ans = 3×1 table

|  | **CZ\_Name** |
| --- | --- |
| **1** | NATCHITOCHES |
| **2** | SABINE |
| **3** | RED RIVER |

The analysis of the Louisiana’s counties data tells that the top three counties from ***LOUISIANA*** ***are*** ***NATCHITOCHES with 21 Events, SABINE with 15 Events and RED RIVER with 9 Events,*** are recorded as the top three counties with most event reported.

## Three Counties with Highest Property Cost in TEXAS

Blow code creates a table names PropCosCounties containg the name of Top three counties of state 1 where highest property Cost occurred in the descending order of Property Cost and also contain the Total Property Cost data.

CountiesPropCosState1 = EventsOnMostImpactedState(EventsOnMostImpactedState.State == State1,:);

PropCosCounties = groupsummary(CountiesPropCosState1,"CZ\_Name","sum","Property\_Cost");

PropCosCounties = sortrows(PropCosCounties,'sum\_Property\_Cost','descend');

PropCosCounties(:,"GroupCount") = [];

PropCosCounties([1,2,3],:)

ans = 3×2 table

|  | **CZ\_Name** | **sum\_Property\_Cost** |
| --- | --- | --- |
| **1** | GALVESTON | 2.0000e+10 |
| **2** | FORT BEND | 1.6004e+10 |
| **3** | MONTGOMERY | 1.4000e+10 |

The analysis of the Texas’s counties data tells that the top three counties from ***TEXAS*** ***are*** ***GALVESTON with $20,000,000,000, FORT BEND with $16,004,000,000 and MONTGOMERY with $14,000,000,000,*** are recorded as the top three counties with Highest Property Cost reported.

## Three Counties with Highest Property Cost in LOUISIANA

Blow code creates a table names PropCosCounties2 containg the name of Top three counties of state 2 where highest property Cost occured in the descending order of Property Cost and lso contain the Total Property Cost data

CountiesPropCosState2 = EventsOnMostImpactedState(EventsOnMostImpactedState.State == State2,:);

PropCosCounties2 = groupsummary(CountiesPropCosState2,"CZ\_Name","sum","Property\_Cost");

PropCosCounties2 = sortrows(PropCosCounties2,'sum\_Property\_Cost','descend');

PropCosCounties2(:,"GroupCount") = [];

PropCosCounties2([1,2,3],:)

ans = 3×2 table

|  | **CZ\_Name** | **sum\_Property\_Cost** |
| --- | --- | --- |
| **1** | CALCASIEU | 60000000 |
| **2** | BEAUREGARD | 15000000 |
| **3** | ACADIA | 200000 |

The analysis of the Louisiana’s counties data tells that the top three counties from ***LOUISIANA are*** ***CALCASIEU with $60,000,000, BEAUREGARD with $15,000,000 and ACADIA with $200,000,*** are recorded as the top three counties with Highest Property Cost reported.

# Conclusions and Recommendations

Analysis of the storm Data 2017 obtained in this Project tells that the insurance company send people to Harris, Galveston, Fort Bend and Montgomery of Texas and Natchotoches, Sabine, Red River, Calcasieu, Beauregard, Acadia from Louisiana.

Insurance company should take Galvenston and Fort Bend from Texas on top priorities as highest property cost and high number of Harvey Events occurred there. As reference, this can be observed from the Analysis block where the table shows the record of top three counties with most events and hight property cost from state 1.