Synopsis

Storms and other severe weather events can cause both public health and economic problems for communities and municipalities. Many severe events can result in fatalities, injuries, and property damage, and preventing such outcomes to the extent possible is a key concern. This report explores the U.S. National Oceanic and Atmospheric Administration’s (NOAA) storm database and presents analysis of top 10 fatalities, injuries, property damages, and crop damages caused by severe weather events

Loading and processing the data

*#Set the working directory*

setwd("D:/Nikhitha/ReproducibleResearch/Week4")

*#Read the file*

fileName <- "Project/repdata\_data\_StormData.csv.bz2"

repdata <- read.csv(bzfile(fileName), na.strings = "NA")

summary(repdata)

## STATE\_\_ BGN\_DATE BGN\_TIME

## Min. : 1.0 5/25/2011 0:00:00: 1202 12:00:00 AM: 10163

## 1st Qu.:19.0 4/27/2011 0:00:00: 1193 06:00:00 PM: 7350

## Median :30.0 6/9/2011 0:00:00 : 1030 04:00:00 PM: 7261

## Mean :31.2 5/30/2004 0:00:00: 1016 05:00:00 PM: 6891

## 3rd Qu.:45.0 4/4/2011 0:00:00 : 1009 12:00:00 PM: 6703

## Max. :95.0 4/2/2006 0:00:00 : 981 03:00:00 PM: 6700

## (Other) :895866 (Other) :857229

## TIME\_ZONE COUNTY COUNTYNAME STATE

## CST :547493 Min. : 0.0 JEFFERSON : 7840 TX : 83728

## EST :245558 1st Qu.: 31.0 WASHINGTON: 7603 KS : 53440

## MST : 68390 Median : 75.0 JACKSON : 6660 OK : 46802

## PST : 28302 Mean :100.6 FRANKLIN : 6256 MO : 35648

## AST : 6360 3rd Qu.:131.0 LINCOLN : 5937 IA : 31069

## HST : 2563 Max. :873.0 MADISON : 5632 NE : 30271

## (Other): 3631 (Other) :862369 (Other):621339

## EVTYPE BGN\_RANGE BGN\_AZI

## HAIL :288661 Min. : 0.000 :547332

## TSTM WIND :219940 1st Qu.: 0.000 N : 86752

## THUNDERSTORM WIND: 82563 Median : 0.000 W : 38446

## TORNADO : 60652 Mean : 1.484 S : 37558

## FLASH FLOOD : 54277 3rd Qu.: 1.000 E : 33178

## FLOOD : 25326 Max. :3749.000 NW : 24041

## (Other) :170878 (Other):134990

## BGN\_LOCATI END\_DATE END\_TIME

## :287743 :243411 :238978

## COUNTYWIDE : 19680 4/27/2011 0:00:00: 1214 06:00:00 PM: 9802

## Countywide : 993 5/25/2011 0:00:00: 1196 05:00:00 PM: 8314

## SPRINGFIELD : 843 6/9/2011 0:00:00 : 1021 04:00:00 PM: 8104

## SOUTH PORTION: 810 4/4/2011 0:00:00 : 1007 12:00:00 PM: 7483

## NORTH PORTION: 784 5/30/2004 0:00:00: 998 11:59:00 PM: 7184

## (Other) :591444 (Other) :653450 (Other) :622432

## COUNTY\_END COUNTYENDN END\_RANGE END\_AZI

## Min. :0 Mode:logical Min. : 0.0000 :724837

## 1st Qu.:0 NA's:902297 1st Qu.: 0.0000 N : 28082

## Median :0 Median : 0.0000 S : 22510

## Mean :0 Mean : 0.9862 W : 20119

## 3rd Qu.:0 3rd Qu.: 0.0000 E : 20047

## Max. :0 Max. :925.0000 NE : 14606

## (Other): 72096

## END\_LOCATI LENGTH WIDTH

## :499225 Min. : 0.0000 Min. : 0.000

## COUNTYWIDE : 19731 1st Qu.: 0.0000 1st Qu.: 0.000

## SOUTH PORTION : 833 Median : 0.0000 Median : 0.000

## NORTH PORTION : 780 Mean : 0.2301 Mean : 7.503

## CENTRAL PORTION: 617 3rd Qu.: 0.0000 3rd Qu.: 0.000

## SPRINGFIELD : 575 Max. :2315.0000 Max. :4400.000

## (Other) :380536

## F MAG FATALITIES INJURIES

## Min. :0.0 Min. : 0.0 Min. : 0.0000 Min. : 0.0000

## 1st Qu.:0.0 1st Qu.: 0.0 1st Qu.: 0.0000 1st Qu.: 0.0000

## Median :1.0 Median : 50.0 Median : 0.0000 Median : 0.0000

## Mean :0.9 Mean : 46.9 Mean : 0.0168 Mean : 0.1557

## 3rd Qu.:1.0 3rd Qu.: 75.0 3rd Qu.: 0.0000 3rd Qu.: 0.0000

## Max. :5.0 Max. :22000.0 Max. :583.0000 Max. :1700.0000

## NA's :843563

## PROPDMG PROPDMGEXP CROPDMG CROPDMGEXP

## Min. : 0.00 :465934 Min. : 0.000 :618413

## 1st Qu.: 0.00 K :424665 1st Qu.: 0.000 K :281832

## Median : 0.00 M : 11330 Median : 0.000 M : 1994

## Mean : 12.06 0 : 216 Mean : 1.527 k : 21

## 3rd Qu.: 0.50 B : 40 3rd Qu.: 0.000 0 : 19

## Max. :5000.00 5 : 28 Max. :990.000 B : 9

## (Other): 84 (Other): 9

## WFO STATEOFFIC

## :142069 :248769

## OUN : 17393 TEXAS, North : 12193

## JAN : 13889 ARKANSAS, Central and North Central: 11738

## LWX : 13174 IOWA, Central : 11345

## PHI : 12551 KANSAS, Southwest : 11212

## TSA : 12483 GEORGIA, North and Central : 11120

## (Other):690738 (Other) :595920

## ZONENAMES

## :594029

## :205988

## GREATER RENO / CARSON CITY / M - GREATER RENO / CARSON CITY / M : 639

## GREATER LAKE TAHOE AREA - GREATER LAKE TAHOE AREA : 592

## JEFFERSON - JEFFERSON : 303

## MADISON - MADISON : 302

## (Other) :100444

## LATITUDE LONGITUDE LATITUDE\_E LONGITUDE\_

## Min. : 0 Min. :-14451 Min. : 0 Min. :-14455

## 1st Qu.:2802 1st Qu.: 7247 1st Qu.: 0 1st Qu.: 0

## Median :3540 Median : 8707 Median : 0 Median : 0

## Mean :2875 Mean : 6940 Mean :1452 Mean : 3509

## 3rd Qu.:4019 3rd Qu.: 9605 3rd Qu.:3549 3rd Qu.: 8735

## Max. :9706 Max. : 17124 Max. :9706 Max. :106220

## NA's :47 NA's :40

## REMARKS REFNUM

## :287433 Min. : 1

## : 24013 1st Qu.:225575

## Trees down.\n : 1110 Median :451149

## Several trees were blown down.\n : 568 Mean :451149

## Trees were downed.\n : 446 3rd Qu.:676723

## Large trees and power lines were blown down.\n: 432 Max. :902297

## (Other) :588295

head(repdata)

## STATE\_\_ BGN\_DATE BGN\_TIME TIME\_ZONE COUNTY COUNTYNAME STATE

## 1 1 4/18/1950 0:00:00 0130 CST 97 MOBILE AL

## 2 1 4/18/1950 0:00:00 0145 CST 3 BALDWIN AL

## 3 1 2/20/1951 0:00:00 1600 CST 57 FAYETTE AL

## 4 1 6/8/1951 0:00:00 0900 CST 89 MADISON AL

## 5 1 11/15/1951 0:00:00 1500 CST 43 CULLMAN AL

## 6 1 11/15/1951 0:00:00 2000 CST 77 LAUDERDALE AL

## EVTYPE BGN\_RANGE BGN\_AZI BGN\_LOCATI END\_DATE END\_TIME COUNTY\_END

## 1 TORNADO 0 0

## 2 TORNADO 0 0

## 3 TORNADO 0 0

## 4 TORNADO 0 0

## 5 TORNADO 0 0

## 6 TORNADO 0 0

## COUNTYENDN END\_RANGE END\_AZI END\_LOCATI LENGTH WIDTH F MAG FATALITIES

## 1 NA 0 14.0 100 3 0 0

## 2 NA 0 2.0 150 2 0 0

## 3 NA 0 0.1 123 2 0 0

## 4 NA 0 0.0 100 2 0 0

## 5 NA 0 0.0 150 2 0 0

## 6 NA 0 1.5 177 2 0 0

## INJURIES PROPDMG PROPDMGEXP CROPDMG CROPDMGEXP WFO STATEOFFIC ZONENAMES

## 1 15 25.0 K 0

## 2 0 2.5 K 0

## 3 2 25.0 K 0

## 4 2 2.5 K 0

## 5 2 2.5 K 0

## 6 6 2.5 K 0

## LATITUDE LONGITUDE LATITUDE\_E LONGITUDE\_ REMARKS REFNUM

## 1 3040 8812 3051 8806 1

## 2 3042 8755 0 0 2

## 3 3340 8742 0 0 3

## 4 3458 8626 0 0 4

## 5 3412 8642 0 0 5

## 6 3450 8748 0 0 6

names(repdata)

## [1] "STATE\_\_" "BGN\_DATE" "BGN\_TIME" "TIME\_ZONE" "COUNTY"

## [6] "COUNTYNAME" "STATE" "EVTYPE" "BGN\_RANGE" "BGN\_AZI"

## [11] "BGN\_LOCATI" "END\_DATE" "END\_TIME" "COUNTY\_END" "COUNTYENDN"

## [16] "END\_RANGE" "END\_AZI" "END\_LOCATI" "LENGTH" "WIDTH"

## [21] "F" "MAG" "FATALITIES" "INJURIES" "PROPDMG"

## [26] "PROPDMGEXP" "CROPDMG" "CROPDMGEXP" "WFO" "STATEOFFIC"

## [31] "ZONENAMES" "LATITUDE" "LONGITUDE" "LATITUDE\_E" "LONGITUDE\_"

## [36] "REMARKS" "REFNUM"

Results

Impact of severe weather events – fatalities

**library**(plyr)

fatalityData <- aggregate(FATALITIES ~ EVTYPE, data = repdata, FUN = "sum")

fatalityData <- arrange(fatalityData, desc(fatalityData[, 2]))

top10fatalityData <- fatalityData[1:10,]

head(top10fatalityData)

## EVTYPE FATALITIES

## 1 TORNADO 5633

## 2 EXCESSIVE HEAT 1903

## 3 FLASH FLOOD 978

## 4 HEAT 937

## 5 LIGHTNING 816

## 6 TSTM WIND 504

Impact of severe weather events – Injury

injuryData <- aggregate(INJURIES ~ EVTYPE, data = repdata, FUN=sum)

injuryData <- arrange(injuryData, desc(injuryData[, 2]))

top10injuryData <- injuryData[1:10,]

head(top10injuryData)

## EVTYPE INJURIES

## 1 TORNADO 91346

## 2 TSTM WIND 6957

## 3 FLOOD 6789

## 4 EXCESSIVE HEAT 6525

## 5 LIGHTNING 5230

## 6 HEAT 2100

Plotting

**library**(ggplot2)

**require**(gridExtra)

## Loading required package: gridExtra

fatalityPlot <- ggplot(top10fatalityData, aes(x = reorder(EVTYPE, -FATALITIES), y = FATALITIES)) +

geom\_bar(stat = "identity") +

xlab("Weather Event Type") +

ylab("Number of Fatalities") +

theme(axis.text.x = element\_text(angle = 45, hjust = 1)) +

ggtitle('Top 10 Fatalities')

injuryPlot <- ggplot(top10injuryData, aes(x = reorder(EVTYPE, -INJURIES), y = INJURIES)) +

geom\_bar(stat = "identity") +

xlab("Weather Event Type") +

ylab("Number of Injuries") +

theme(axis.text.x = element\_text(angle = 45, hjust = 1)) +

ggtitle('Top 10 Injuries')

grid.arrange(fatalityPlot, injuryPlot, nrow = 1)

Impact of severe weather events with respect to economic consequences

Impact of severe weather events with respect to economic consequences – Property damage

PropertyDamageData <- aggregate(PROPDMG ~ EVTYPE, data = repdata, FUN=sum)

PropertyDamageData <- arrange(PropertyDamageData, desc(PropertyDamageData[, 2]))

top10PropertyDamageData <- PropertyDamageData[1:10,]

head(top10PropertyDamageData)

## EVTYPE PROPDMG

## 1 TORNADO 3212258.2

## 2 FLASH FLOOD 1420124.6

## 3 TSTM WIND 1335965.6

## 4 FLOOD 899938.5

## 5 THUNDERSTORM WIND 876844.2

## 6 HAIL 688693.4

Impact of severe weather events with respect to economic consequences – Crop damage

CropDamageData <- aggregate(CROPDMG ~ EVTYPE, data = repdata, FUN=sum)

CropDamageData <- arrange(CropDamageData, desc(CropDamageData[, 2]))

top10CropDamageData <- CropDamageData[1:10,]

head(top10CropDamageData)

## EVTYPE CROPDMG

## 1 HAIL 579596.28

## 2 FLASH FLOOD 179200.46

## 3 FLOOD 168037.88

## 4 TSTM WIND 109202.60

## 5 TORNADO 100018.52

## 6 THUNDERSTORM WIND 66791.45

Plotting the economic consequences plot

**library**(ggplot2)

**require**(gridExtra)

PropertyPlot <- ggplot(top10PropertyDamageData, aes(x = reorder(EVTYPE, -PROPDMG), y = PROPDMG)) +

geom\_bar(stat = "identity") +

xlab("Weather Event Type") +

ylab("Property Damage") +

theme(axis.text.x = element\_text(angle = 45, hjust = 1)) +

ggtitle('Top 10 Property Damage')

CropDamagePlot <- ggplot(top10CropDamageData, aes(x = reorder(EVTYPE, -CROPDMG), y = CROPDMG)) +

geom\_bar(stat = "identity") +

xlab("Weather Event Type") +

ylab("Property Damage") +

theme(axis.text.x = element\_text(angle = 45, hjust = 1)) +

ggtitle('Top 10 Crop Damage')

grid.arrange(PropertyPlot, CropDamagePlot, nrow = 1)