Storms and other severe weather events' effect on both public health and economics

Introduction

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 project involves exploring the U.S. National Oceanic and Atmospheric Administration's (NOAA) storm database. This database tracks characteristics of major storms and weather events in the United States, including when and where they occur, as well as estimates of any fatalities, injuries, and property damage.

First we'll download the NOAA storm dataset and prepare the environment

download the [NOAA storm database]

```
if (! file.exists('stormData.csv.bz2')){

  download.file('https://d396qusza40orc.cloudfront.net/repdata%2Fdata%2FStormData.csv.bz2',destfile
= 'stormData.csv.bz2',method = 'curl',mode = 'w')



}
```

Summary

our goal from this analysis is to show the effect of severe weather events on humans (fatalities and injuries) and economics (Flood-Related Damages and Property-Related Damages)

now we'll extract the dataset and read it to a data frame

```
if(!exists('stormData')){

  strmDataZip <- 'stormData.csv.bz2'

  stormDataFile <- bzfile(description=strmDataZip, open="r")

  stormData <- read.csv(stormDataFile,fill = TRUE,header = T)

  close(stormDataFile)

}
```

data processing

we'll process the data to get our intended results

```
require(ggplot2)
```

```
## Loading required package: ggplot2
```

```
require(reshape2)
```

```
## Loading required package: reshape2
```

```
require(plyr)
```

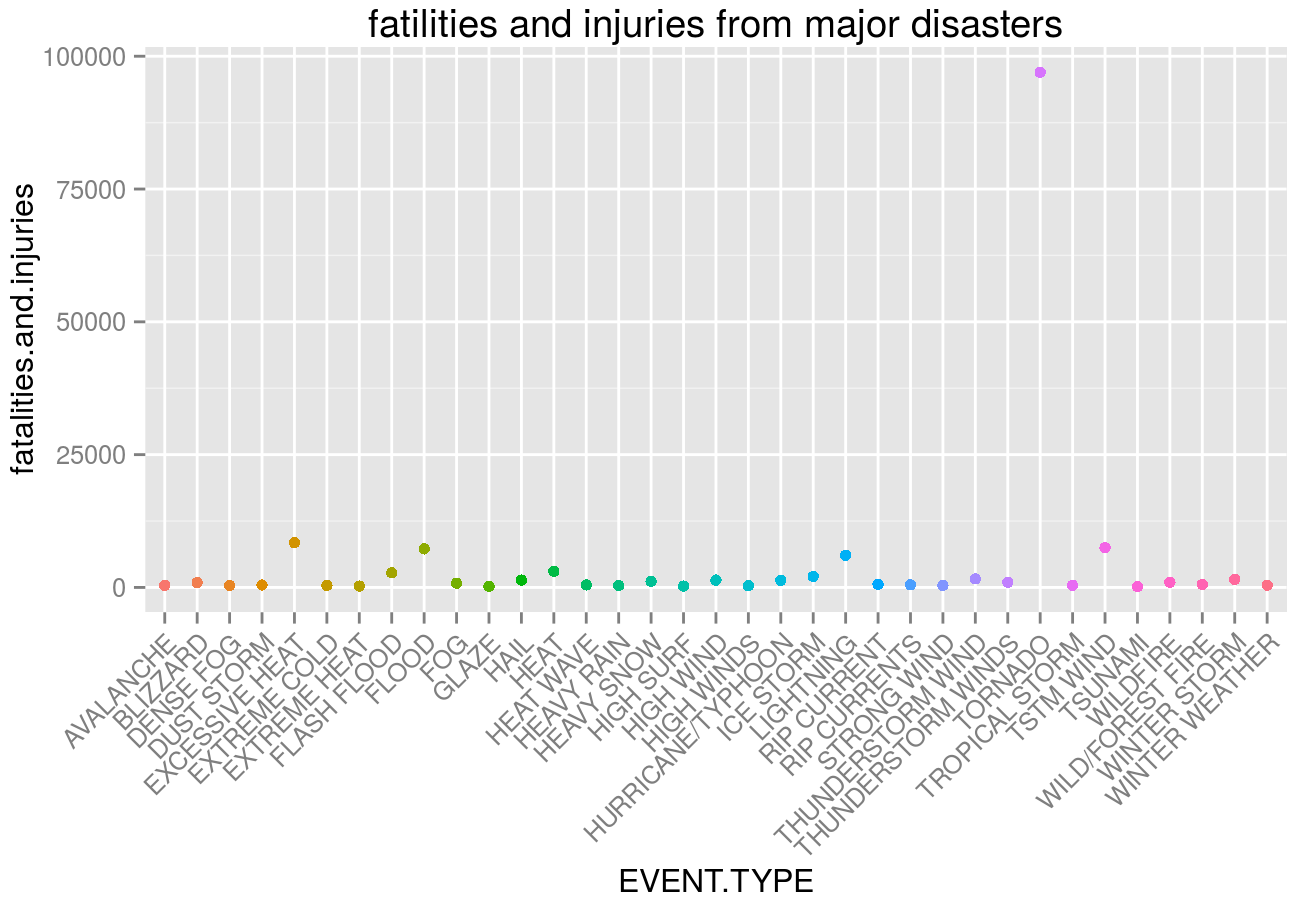
```
## Loading required package: plyr
```

```
stormDataEOPH <- as.data.frame(cbind(stormData$EVTYPE,stormData$FATALITIES+stormData$INJURIES))

names(stormDataEOPH) <- c('EVENT.TYPE','fatalities.and.injuries')


stormDataEOPH$EVENT.TYPE <- as.factor(stormDataEOPH$EVENT.TYPE)

levels(stormDataEOPH$EVENT.TYPE) <- levels(stormData$EVTYPE)




summary <- ddply(.data = stormDataEOPH,.(EVENT.TYPE),summarize,sum(fatalities.and.injuries))

names(summary)[2] <- 'fatalities.and.injuries'

summary$EVENT.TYPE  <- as.factor(summary$EVENT.TYPE)

levels(summary$EVENT.TYPE) <- levels(stormData$EVTYPE)

ord.summary <- summary[order(summary$fatalities.and.injuries,decreasing = T),]

m <- mean(ord.summary$fatalities.and.injuries)

susS <- subset(ord.summary,fatalities.and.injuries>m)


median <- median(unique(stormDataEOPH$fatalities.and.injuries))

subData <- subset(stormDataEOPH,fatalities.and.injuries>median)
```

Results

and we can see that there are a certain events that contreputed heavely in the fatilities and injuries in the united states compared to other events
below we show the major kinds of disasters

```
ggplot(susS,aes(EVENT.TYPE,fatalities.and.injuries)) + geom_point(aes(colour=EVENT.TYPE)) + theme(l
egend.position="none",axis.text.x = element_text(angle = 45, hjust = 1)) + ggtitle('fatilities and
injuries from major disasters')
```



in this plot we show the most severe weather events and their impact on the total number of fatalities and injuries

and here is a list of 20 events that cause the most human damages sorted decreasingly

```
top20 <- head(susS,20)

rownames(top20) <- 1:20

print(top20)
```

```
##            EVENT.TYPE fatalities.and.injuries

## 1             TORNADO                   96979

## 2      EXCESSIVE HEAT                    8428

## 3           TSTM WIND                    7461

## 4               FLOOD                    7259

## 5           LIGHTNING                    6046

## 6                HEAT                    3037

## 7         FLASH FLOOD                    2755

## 8           ICE STORM                    2064
```

```
## 9   THUNDERSTORM WIND                   1621
## 10       WINTER STORM                   1527
## 11          HIGH WIND                   1385
## 12               HAIL                   1376
## 13  HURRICANE/TYPHOON                   1339
## 14         HEAVY SNOW                   1148
## 15           WILDFIRE                    986
## 16 THUNDERSTORM WINDS                    972
## 17           BLIZZARD                    906
## 18                FOG                    796
## 19        RIP CURRENT                    600
## 20   WILD/FOREST FIRE                    557
```

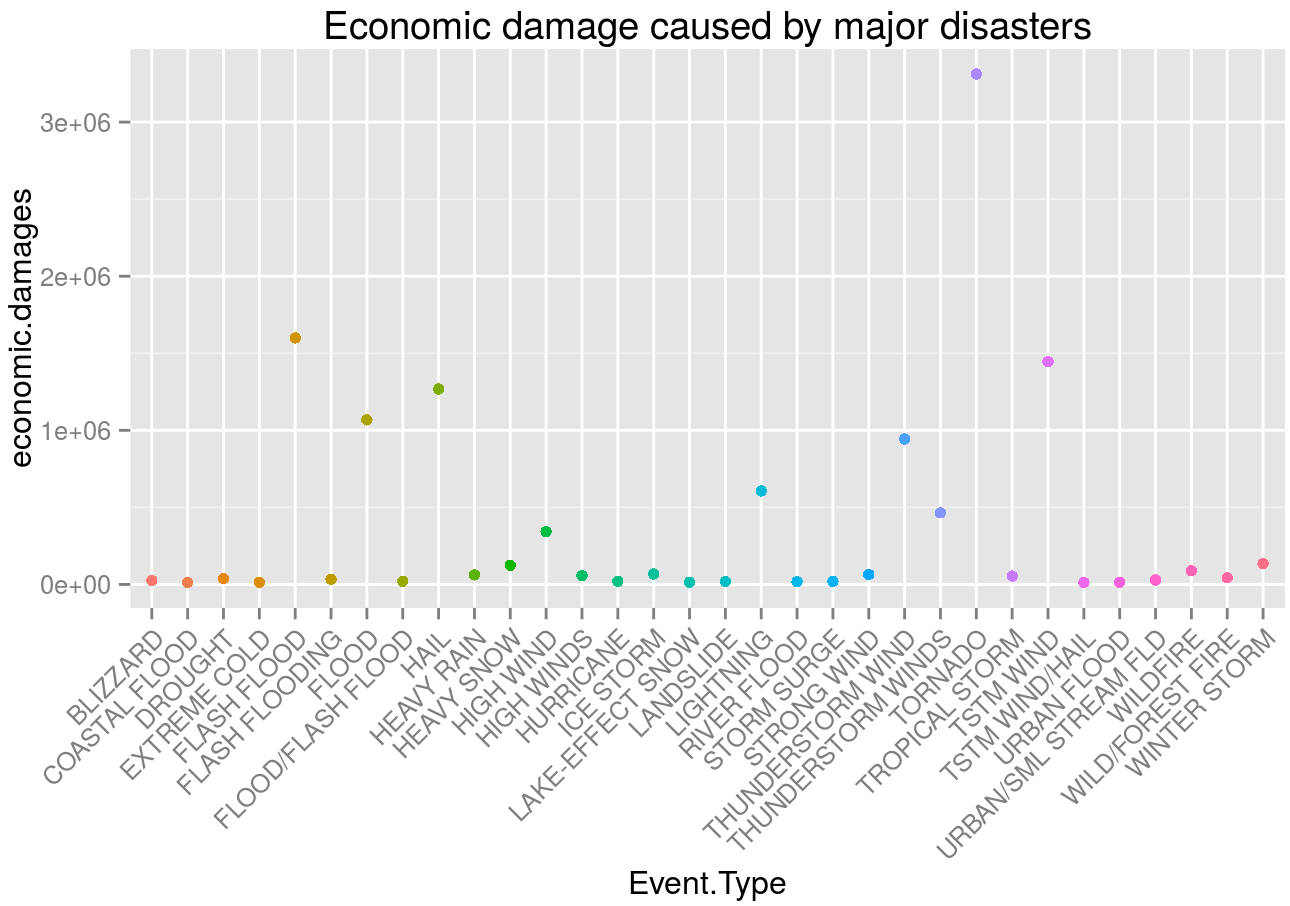
and to demonstrate the events that cased the most damage on the economy

data processing

```
stormDataEOE <- as.data.frame(cbind(stormData$EVTYPE,stormData$PROPDMG+stormData$CROPDMG))

names(stormDataEOE) <- c('Event.Type','economic.damages')


summary <- ddply(.data = stormDataEOE,.(Event.Type),summarize,sum(economic.damages))

names(summary)[2] <- "economic.damages"

summary$Event.Type  <- as.factor(summary$Event.Type)

levels(summary$Event.Type) <- levels(stormData$EVTYPE)

ord.summary <- summary[order(summary$economic.damages,decreasing = T),]

m <- mean(ord.summary$economic.damages)

susS <- subset(ord.summary,economic.damages>m)
```

Results

```
ggplot(susS,aes(Event.Type,economic.damages)) + geom_point(aes(colour=Event.Type)) + theme(legend.p
osition="none",axis.text.x = element_text(angle = 45, hjust = 1)) + ggtitle('Economic damage caused
by major disasters')
```



in this plot we show the most severe weather events and their impact on the total damage on the crops and property

and this is a list of 20 events that cause the most economy damages sorted decreasingly

```
top20 <- head(susS,20)

rownames(top20) <- 1:20

print(top20)
```

```
##            Event.Type economic.damages
## 1             TORNADO          3312277
## 2         FLASH FLOOD          1599325
## 3           TSTM WIND          1445168
## 4                HAIL          1268290
## 5               FLOOD          1067976
## 6   THUNDERSTORM WIND           943636
## 7           LIGHTNING           606932
## 8  THUNDERSTORM WINDS           464978
```

```
## 9           HIGH WIND          342015
## 10       WINTER STORM          134700
## 11         HEAVY SNOW          124418
## 12           WILDFIRE           88824
## 13          ICE STORM           67690
## 14        STRONG WIND           64611
## 15         HEAVY RAIN           61965
## 16         HIGH WINDS           57385
## 17     TROPICAL STORM           54323
## 18   WILD/FOREST FIRE           43534
## 19            DROUGHT           37998
## 20     FLASH FLOODING           33623
```