

Comparison of Severe Weather Inregards To Fatalaties and Injuries and Econmical Cost

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Synopsis

Weather events across the US can have devistating consiquenses, both economical and bodily. To best prepare for weather related disasters its best to look at the weather events that are most likely to inflict damage. The data came from Coursera's Reproducible Research class. It consists of data from 1950s till 2011. The authors of the oringinal data believe more current information is more accurate and complete. The weather events that cause the most destruction are tornados and floods. Other events like huri-canes/typhoon cause more econoimcal damage, while heat and lighting contribute more to injuries/fatalaties.

Data Processing

The data was downloaded from Coursera's web site. Values for finincial cost of weather related destruction had to be calculated by altering the character given for dollar amount,(i.e. m = million) and converting it to a numeric amount. It is not know if the econcomical information is altered for inflation. Totals where calculated for injuries + fatalaties and cost for property damage + cost of agricultural damage. If either of these values were greater than zero, they event was extracted to a new dataframe. Next all events were lowercased (to allow for combining events) producing >400 events. Like events were combined into 37 events with "other" going to events that could not easily be placed with others. An example of event would be Hurican Opal changed to hurricane/typhoon.

read the file and select only needed fields

```
knitr::opts_chunk$set(echo = TRUE)

readcsvbz2file <- read.csv(bzfile("repdata%2Fdata%2FStormData.csv.bz2"))

dat <- subset(readcsvbz2file, select = c("STATE", "EVTYPE", "FATALITIES", "INJURIES", "I
```

convert columns represented by characters into numbers for totals

```
dat$PROPDMGEXP <- as.character(dat$PROPDMGEXP)
dat$CROPDMGEXP <- as.character(dat$CROPDMGEXP)

dat$PROPDMGEXP[dat$PROPDMGEXP == 'K'] <- 1000
dat$PROPDMGEXP[dat$PROPDMGEXP == 'M'] <- 1000000
dat$PROPDMGEXP[dat$PROPDMGEXP == 'B'] <- 1000000000
dat$PROPDMGEXP[dat$PROPDMGEXP == ''] <- 0
dat$PROPDMGEXP[dat$PROPDMGEXP == 'NA'] <- 0
```

```

dat$CROPDMGEXP[dat$CROPDMGEXP == 'K'] <- 1000
dat$CROPDMGEXP[dat$CROPDMGEXP == 'M'] <- 1000000
dat$CROPDMGEXP[dat$CROPDMGEXP == 'B'] <- 1000000000
dat$CROPDMGEXP[dat$CROPDMGEXP == ''] <- 0
dat$CROPDMGEXP[dat$CROPDMGEXP == 'NA'] <- 0

```

```

dat$PROPDMGEXP <- as.numeric(dat$PROPDMGEXP)

```

Warning: NAs introduced by coercion

```

dat$CROPDMGEXP <- as.numeric(dat$CROPDMGEXP)

```

Warning: NAs introduced by coercion

```

dat$CROPDMGEXP[dat$CROPDMGEXP == 'NA'] <- 0
dat$PROPDMGEXP[dat$PROPDMGEXP == 'NA'] <- 0
dat$PROPDMGEXP <- as.numeric(dat$PROPDMGEXP)
dat$CROPDMGEXP <- as.numeric(dat$CROPDMGEXP)

```

calculate totals making sure na's are included and assumed to be zero

```

dat$TotalInjury <- dat$FATALITIES + dat$INJURIES
dat$totalPROPDGM <- dat$PROPDGM * dat$PROPDMGEXP
dat$totalPROPDGM[dat$totalPROPDGM == 'NA'] <- 0
dat$totalCROPDMG <- dat$CROPDMG * dat$PROPDMGEXP
dat$totalCROPDMG[dat$totalCROPDMG == 'NA'] <- 0

dat$totalCost <- dat$totalPROPDGM + dat$totalCROPDMG

```

extract data with values

```

newdata <- dat[ which(dat$TotalInjury > 0 | dat$totalCost > 0), ]
newdata2 <- dat[ which(dat$TotalInjury > 0 | dat$totalCost > 0), ]

```

combine like data

```

newdata$EVTYPE <- tolower(newdata$EVTYPE)
newdata$EVTYPE[newdata$EVTYPE == ' high surf advisory'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == ' flash flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == ' tstm wind'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == ' tstm wind (g45)'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == '?'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'apache county'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'astronomical high tide'] <- 'astronomical'
newdata$EVTYPE[newdata$EVTYPE == 'astronomical low tide'] <- 'astronomical'
newdata$EVTYPE[newdata$EVTYPE == 'avalance'] <- 'avalanche'

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newdata$EVTYPE[newdata$EVTYPE == 'avalanche'] <- 'avalanche'
newdata$EVTYPE[newdata$EVTYPE == 'beach erosion'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'black ice'] <- 'ice'
newdata$EVTYPE[newdata$EVTYPE == 'blizzard'] <- 'winter storm'
newdata$EVTYPE[newdata$EVTYPE == 'blizzard/winter storm'] <- 'winter storm'
newdata$EVTYPE[newdata$EVTYPE == 'blowing dust'] <- 'dust'
newdata$EVTYPE[newdata$EVTYPE == 'blowing snow'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'brush fire'] <- 'smoke/fire'
newdata$EVTYPE[newdata$EVTYPE == 'coastal flooding/erosion'] <- 'coastal'
newdata$EVTYPE[newdata$EVTYPE == 'coastal erosion'] <- 'coastal'
newdata$EVTYPE[newdata$EVTYPE == 'coastal flood'] <- 'coastal'
newdata$EVTYPE[newdata$EVTYPE == 'coastal flooding'] <- 'coastal'
newdata$EVTYPE[newdata$EVTYPE == 'coastal flooding/erosion'] <- 'coastal'
newdata$EVTYPE[newdata$EVTYPE == 'coastal storm'] <- 'coastal'
newdata$EVTYPE[newdata$EVTYPE == 'coastal surge'] <- 'coastal'
newdata$EVTYPE[newdata$EVTYPE == 'coastalstorm'] <- 'coastal'
newdata$EVTYPE[newdata$EVTYPE == 'cold'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'cold air tornado'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'cold and snow'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'cold temperature'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'cold wave'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'cold weather'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'cold/wind chill'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'cold/winds'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'dam break'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'damaging freeze'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'dense fog'] <- 'fog'
newdata$EVTYPE[newdata$EVTYPE == 'dense smoke'] <- 'smoke/fire'
newdata$EVTYPE[newdata$EVTYPE == 'downburst'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'drought'] <- 'drought'
newdata$EVTYPE[newdata$EVTYPE == 'drought/excessive heat'] <- 'drought'
newdata$EVTYPE[newdata$EVTYPE == 'drowning'] <- 'drowning'
newdata$EVTYPE[newdata$EVTYPE == 'dry microburst'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'dry mircoburst winds'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'dust devil'] <- 'dust'
newdata$EVTYPE[newdata$EVTYPE == 'dust devil waterspout'] <- 'dust'
newdata$EVTYPE[newdata$EVTYPE == 'dust storm'] <- 'dust'
newdata$EVTYPE[newdata$EVTYPE == 'dust storm/high winds'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'erosion/cstl flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'excessive rainfall'] <- 'rain'
newdata$EVTYPE[newdata$EVTYPE == 'excessive snow'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'extended cold'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'extreme cold'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'extreme cold/wind chill'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'extreme heat'] <- 'heat'
newdata$EVTYPE[newdata$EVTYPE == 'extreme wind chill'] <- 'windchill'
newdata$EVTYPE[newdata$EVTYPE == 'extreme windchill'] <- 'windchill'
newdata$EVTYPE[newdata$EVTYPE == 'falling snow/ice'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'flash flood - heavy rain'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flash flood from ice jams'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flash flood landslides'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flash flood/'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flash flood/ street'] <- 'flood'

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newdata$EVTYPE[newdata$EVTYPE == 'flash flood/flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flash flood/landslide'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flash flooding'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flash flooding/flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flash flooding/thunderstorm wi'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flash floods'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flood & heavy rain'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flood flash'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flood/flash'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flood/flash flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flood/flash/flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flood/flashflood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flood/river flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'flooding'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'floods'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'fog'] <- 'fog'
newdata$EVTYPE[newdata$EVTYPE == 'fog and cold temperatures'] <- 'fog'
newdata$EVTYPE[newdata$EVTYPE == 'forest fires'] <- 'smoke/fire'
newdata$EVTYPE[newdata$EVTYPE == 'freeze'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'freezing drizzle'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'freezing fog'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'freezing rain'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'freezing rain/sleet'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'freezing rain/snow'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'freezing spray'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'frost'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'frost/freeze'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'frost\freeze'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'funnel cloud'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'glaze'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'glaze ice'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'glaze/ice storm'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'gradient wind'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'grass fires'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'ground blizzard'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'gustnado'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'gusty wind'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'gusty wind/hail'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'gusty wind/hvy rain'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'gusty wind/rain'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'gusty winds'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'hail'] <- 'hail'
newdata$EVTYPE[newdata$EVTYPE == 'hail 0.75'] <- 'hail'
newdata$EVTYPE[newdata$EVTYPE == 'hail 100'] <- 'hail'
newdata$EVTYPE[newdata$EVTYPE == 'hail 175'] <- 'hail'
newdata$EVTYPE[newdata$EVTYPE == 'hail 275'] <- 'hail'
newdata$EVTYPE[newdata$EVTYPE == 'hail 450'] <- 'hail'
newdata$EVTYPE[newdata$EVTYPE == 'hail 75'] <- 'hail'
newdata$EVTYPE[newdata$EVTYPE == 'hail damage'] <- 'hail'
newdata$EVTYPE[newdata$EVTYPE == 'hail/wind'] <- 'hail'
newdata$EVTYPE[newdata$EVTYPE == 'hail/winds'] <- 'hail'
newdata$EVTYPE[newdata$EVTYPE == 'hailstorm'] <- 'hail'

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newdata$EVTYPE[newdata$EVTYPE == 'hazardous surf'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'heat'] <- 'heat'
newdata$EVTYPE[newdata$EVTYPE == 'heat wave'] <- 'heat'
newdata$EVTYPE[newdata$EVTYPE == 'heat wave drought'] <- 'heat'
newdata$EVTYPE[newdata$EVTYPE == 'heat waves'] <- 'heat'
newdata$EVTYPE[newdata$EVTYPE == 'heavy lake snow'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'heavy mix'] <- 'mixed'
newdata$EVTYPE[newdata$EVTYPE == 'heavy precipitation'] <- 'rain'
newdata$EVTYPE[newdata$EVTYPE == 'heavy rain'] <- 'rain'
newdata$EVTYPE[newdata$EVTYPE == 'heavy rain and flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'heavy rain/high surf'] <- 'rain'
newdata$EVTYPE[newdata$EVTYPE == 'heavy rain/lightning'] <- 'lightning'
newdata$EVTYPE[newdata$EVTYPE == 'heavy rain/severe weather'] <- 'rain'
newdata$EVTYPE[newdata$EVTYPE == 'heavy rain/small stream urban'] <- 'rain'
newdata$EVTYPE[newdata$EVTYPE == 'heavy rain/snow'] <- 'mixed'
newdata$EVTYPE[newdata$EVTYPE == 'heavy rains'] <- 'rain'
newdata$EVTYPE[newdata$EVTYPE == 'heavy rains/flooding'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'heavy seas'] <- 'seas'
newdata$EVTYPE[newdata$EVTYPE == 'heavy shower'] <- 'rain'
newdata$EVTYPE[newdata$EVTYPE == 'heavy snow'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'heavy snow and high winds'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'heavy snow and strong winds'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'heavy snow shower'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'heavy snow squalls'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'heavy snow/blizzard'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'heavy snow/blizzard/avalanche'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'heavy snow/freezing rain'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'heavy snow/high winds & flood'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'heavy snow/ice'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'heavy snow/squalls'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'heavy snow/wind'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'heavy snow/winter storm'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'heavy snowpack'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'heavy snow-squalls'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'heavy surf'] <- 'surf'
newdata$EVTYPE[newdata$EVTYPE == 'heavy surf and wind'] <- 'surf'
newdata$EVTYPE[newdata$EVTYPE == 'heavy surf coastal flooding'] <- 'surf'
newdata$EVTYPE[newdata$EVTYPE == 'heavy surf/high surf'] <- 'surf'
newdata$EVTYPE[newdata$EVTYPE == 'heavy swells'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'high'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'high winds'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'high seas'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'high surf'] <- 'surf'
newdata$EVTYPE[newdata$EVTYPE == 'high swells'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'high water'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'high waves'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'high wind'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'high wind (g40)'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'high wind 48'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'high wind and seas'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'high wind damage'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'high wind/blizzard'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'high wind/heavy snow'] <- 'wind'

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newdata$EVTYPE[newdata$EVTYPE == 'high wind/seas'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'high winds'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'high winds heavy rains'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'high winds/'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'high winds/coastal flood'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'high winds/cold'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'high winds/heavy rain'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'high winds/snow'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'hurricane/typhoon'] <- 'hurricane/typhoon'
newdata$EVTYPE[newdata$EVTYPE == 'hurricane edouard'] <- 'hurricane/typhoon'
newdata$EVTYPE[newdata$EVTYPE == 'hurricane emily'] <- 'hurricane/typhoon'
newdata$EVTYPE[newdata$EVTYPE == 'hurricane erin'] <- 'hurricane/typhoon'
newdata$EVTYPE[newdata$EVTYPE == 'hurricane felix'] <- 'hurricane/typhoon'
newdata$EVTYPE[newdata$EVTYPE == 'hurricane gordon'] <- 'hurricane/typhoon'
newdata$EVTYPE[newdata$EVTYPE == 'hurricane/typhoon'] <- 'hurricane/typhoon'
newdata$EVTYPE[newdata$EVTYPE == 'hurricane-generated swells'] <- 'hurricane/typhoon'
newdata$EVTYPE[newdata$EVTYPE == 'hyperthermia/exposure'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'hypothermia'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'hypothermia/exposure'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'ice'] <- 'ice'
newdata$EVTYPE[newdata$EVTYPE == 'ice and snow'] <- 'ice'
newdata$EVTYPE[newdata$EVTYPE == 'ice floes'] <- 'ice'
newdata$EVTYPE[newdata$EVTYPE == 'ice jam'] <- 'ice'
newdata$EVTYPE[newdata$EVTYPE == 'ice jam flood (minor)'] <- 'ice'
newdata$EVTYPE[newdata$EVTYPE == 'ice jam flooding'] <- 'ice'
newdata$EVTYPE[newdata$EVTYPE == 'ice on road'] <- 'ice'
newdata$EVTYPE[newdata$EVTYPE == 'ice roads'] <- 'ice'
newdata$EVTYPE[newdata$EVTYPE == 'ice storm'] <- 'ice'
newdata$EVTYPE[newdata$EVTYPE == 'ice storm/flash flood'] <- 'ice'
newdata$EVTYPE[newdata$EVTYPE == 'ice/strong winds'] <- 'ice'
newdata$EVTYPE[newdata$EVTYPE == 'icy roads'] <- 'ice'
newdata$EVTYPE[newdata$EVTYPE == 'lake effect snow'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'lake flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'lake-effect snow'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'lakeshore flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'landslide'] <- 'landslides'
newdata$EVTYPE[newdata$EVTYPE == 'landslides'] <- 'landslides'
newdata$EVTYPE[newdata$EVTYPE == 'landslump'] <- 'landslides'
newdata$EVTYPE[newdata$EVTYPE == 'landspout'] <- 'landslides'
newdata$EVTYPE[newdata$EVTYPE == 'late season snow'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'light freezing rain'] <- 'rain'
newdata$EVTYPE[newdata$EVTYPE == 'light snow'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'light snowfall'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'lighting'] <- 'lightning'
newdata$EVTYPE[newdata$EVTYPE == 'lightning'] <- 'lightning'
newdata$EVTYPE[newdata$EVTYPE == 'lightning wauseon'] <- 'lightning'
newdata$EVTYPE[newdata$EVTYPE == 'lightning and heavy rain'] <- 'lightning'
newdata$EVTYPE[newdata$EVTYPE == 'lightning and thunderstorm win'] <- 'lightning'
newdata$EVTYPE[newdata$EVTYPE == 'lightning fire'] <- 'lightning'
newdata$EVTYPE[newdata$EVTYPE == 'lightning injury'] <- 'lightning'
newdata$EVTYPE[newdata$EVTYPE == 'lightning thunderstorm winds'] <- 'lightning'
newdata$EVTYPE[newdata$EVTYPE == 'lightning.'] <- 'lightning'
newdata$EVTYPE[newdata$EVTYPE == 'lightning/heavy rain'] <- 'lightning'

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newdata$EVTYPE[newdata$EVTYPE == 'lightning'] <- 'lightning'
newdata$EVTYPE[newdata$EVTYPE == 'low temperature'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'major flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'marine accident'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'marine hail'] <- 'hail'
newdata$EVTYPE[newdata$EVTYPE == 'marine high wind'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'marine mishap'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'marine strong wind'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'marine thunderstorm wind'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'marine tstm wind'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'microburst'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'microburst winds'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'minor flooding'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'mixed precip'] <- 'mixed'
newdata$EVTYPE[newdata$EVTYPE == 'mixed precipitation'] <- 'mixed'
newdata$EVTYPE[newdata$EVTYPE == 'mud slide'] <- 'landslides'
newdata$EVTYPE[newdata$EVTYPE == 'mud slides'] <- 'landslides'
newdata$EVTYPE[newdata$EVTYPE == 'mud slides urban flooding'] <- 'landslides'
newdata$EVTYPE[newdata$EVTYPE == 'mudslide'] <- 'landslides'
newdata$EVTYPE[newdata$EVTYPE == 'mudslides'] <- 'landslides'
newdata$EVTYPE[newdata$EVTYPE == 'non tstm wind'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'non-severe wind damage'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'non-tstm wind'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'other'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'rain'] <- 'rain'
newdata$EVTYPE[newdata$EVTYPE == 'rain/snow'] <- 'rain'
newdata$EVTYPE[newdata$EVTYPE == 'rain/wind'] <- 'rain'
newdata$EVTYPE[newdata$EVTYPE == 'rainstorm'] <- 'rain'
newdata$EVTYPE[newdata$EVTYPE == 'rapidly rising water'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'record cold'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'record heat'] <- 'heat'
newdata$EVTYPE[newdata$EVTYPE == 'record rainfall'] <- 'rain'
newdata$EVTYPE[newdata$EVTYPE == 'record snow'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'record/excessive heat'] <- 'heat'
newdata$EVTYPE[newdata$EVTYPE == 'rip current'] <- 'rip current'
newdata$EVTYPE[newdata$EVTYPE == 'rip currents'] <- 'rip current'
newdata$EVTYPE[newdata$EVTYPE == 'rip currents/heavy surf'] <- 'rip current'
newdata$EVTYPE[newdata$EVTYPE == 'river and stream flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'river flooding'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'rock slide'] <- 'landslides'
newdata$EVTYPE[newdata$EVTYPE == 'rogue wave'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'rough seas'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'rough surf'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'rural flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'seiche'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'severe thunderstorm'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'severe thunderstorm winds'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'severe thunderstorms'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'severe turbulence'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'sleet'] <- 'ice'
newdata$EVTYPE[newdata$EVTYPE == 'sleet/ice storm'] <- 'ice'
newdata$EVTYPE[newdata$EVTYPE == 'small hail'] <- 'hail'
newdata$EVTYPE[newdata$EVTYPE == 'snow'] <- 'snow'

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newdata$EVTYPE[newdata$EVTYPE == 'snow accumulation'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snow and heavy snow'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snow and ice'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snow and ice storm'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snow freezing rain'] <- 'freezing'
newdata$EVTYPE[newdata$EVTYPE == 'snow squall'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snow squalls'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snow/ bitter cold'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snow/ ice'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snow/blowing snow'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snow/cold'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snow/freezing rain'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snow/heavy snow'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snow/high winds'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snow/ice'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snow/ice storm'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snow/sleet'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snow/sleet/freezing rain'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'snowmelt flooding'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'storm force winds'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'storm surge/tide'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'strong wind'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'strong winds'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm winds'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'thundeerstorm winds'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'thunderestorm winds'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'thundersnow'] <- 'snow'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm winds'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm damage to'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm hail'] <- 'hail'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm wind'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm wind (g40)'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm wind 60 mph'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm wind 65 mph'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm wind 65mph'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm wind 98 mph'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm wind g52'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm wind g55'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm wind trees'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm wind/ tree'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm wind/ trees'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm wind/awning'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm wind/hail'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm wind/lightning'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm winds'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm winds 13'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm winds 63 mph'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm winds and'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm winds hail'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm winds lightning'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm winds.'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm winds/ flood'] <- 'thunderstorm'

```



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newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm winds/flooding'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm winds/funnel clou'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm winds/hail'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm winds53'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm windshail'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm windss'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm wins'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorms'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorms wind'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorms winds'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstormw'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstormwinds'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstrom wind'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunderstorm winds'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'thunerstorm winds'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'tidal flooding'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'tornado'] <- 'tornado'
newdata$EVTYPE[newdata$EVTYPE == 'tornado f0'] <- 'tornado'
newdata$EVTYPE[newdata$EVTYPE == 'tornado f1'] <- 'tornado'
newdata$EVTYPE[newdata$EVTYPE == 'tornado f2'] <- 'tornado'
newdata$EVTYPE[newdata$EVTYPE == 'tornado f3'] <- 'tornado'
newdata$EVTYPE[newdata$EVTYPE == 'tornadoes, tstm wind, hail'] <- 'tornado'
newdata$EVTYPE[newdata$EVTYPE == 'torndao'] <- 'tornado'
newdata$EVTYPE[newdata$EVTYPE == 'torrential rainfall'] <- 'rain'
newdata$EVTYPE[newdata$EVTYPE == 'tropical depression'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tropical storm'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tropical storm alberto'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tropical storm dean'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tropical storm gordon'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tropical storm jerry'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tstm wind (g45)'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tstm wind (41)'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tstm wind (g35)'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tstm wind (g40)'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tstm wind (g45)'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tstm wind 40'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tstm wind 45'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tstm wind 55'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tstm wind 65)'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tstm wind and lightning'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tstm wind damage'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tstm wind g45'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tstm wind g58'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tstm wind/hail'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tstm winds'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tstmw'] <- 'tstm'
newdata$EVTYPE[newdata$EVTYPE == 'tsunami'] <- 'tsunami'
newdata$EVTYPE[newdata$EVTYPE == 'tunderstorm wind'] <- 'thunderstorm'
newdata$EVTYPE[newdata$EVTYPE == 'typhoon'] <- 'hurricane/typhoon'
newdata$EVTYPE[newdata$EVTYPE == 'unseasonably cold'] <- 'cold'
newdata$EVTYPE[newdata$EVTYPE == 'unseasonably warm'] <- 'warm'
newdata$EVTYPE[newdata$EVTYPE == 'unseasonably warm and dry'] <- 'warm'
newdata$EVTYPE[newdata$EVTYPE == 'urban and small'] <- 'other'

```

```

newdata$EVTYPE[newdata$EVTYPE == 'urban and small stream floodin'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'urban flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'urban flooding'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'urban floods'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'urban small'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'urban/small stream'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'urban/small stream flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'urban/sml stream fld'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'volcanic ash'] <- 'volcanic'
newdata$EVTYPE[newdata$EVTYPE == 'warm weather'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'waterspout'] <- 'waterspout'
newdata$EVTYPE[newdata$EVTYPE == 'waterspout-'] <- 'waterspout'
newdata$EVTYPE[newdata$EVTYPE == 'waterspout tornado'] <- 'tornado'
newdata$EVTYPE[newdata$EVTYPE == 'waterspout/ tornado'] <- 'tornado'
newdata$EVTYPE[newdata$EVTYPE == 'waterspout/tornado'] <- 'tornado'
newdata$EVTYPE[newdata$EVTYPE == 'waterspout-tornado'] <- 'tornado'
newdata$EVTYPE[newdata$EVTYPE == 'wet microburst'] <- 'other'
newdata$EVTYPE[newdata$EVTYPE == 'whirlwind'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'wild fires'] <- 'smoke/fire'
newdata$EVTYPE[newdata$EVTYPE == 'wild/forest fire'] <- 'smoke/fire'
newdata$EVTYPE[newdata$EVTYPE == 'wild/forest fires'] <- 'smoke/fire'
newdata$EVTYPE[newdata$EVTYPE == 'wildfire'] <- 'smoke/fire'
newdata$EVTYPE[newdata$EVTYPE == 'wildfires'] <- 'smoke/fire'
newdata$EVTYPE[newdata$EVTYPE == 'wind'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'wind and wave'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'wind damage'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'wind storm'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'wind/hail'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'winds'] <- 'wind'
newdata$EVTYPE[newdata$EVTYPE == 'winter storm'] <- 'winter storm'
newdata$EVTYPE[newdata$EVTYPE == 'winter storm high winds'] <- 'winter storm'
newdata$EVTYPE[newdata$EVTYPE == 'winter storms'] <- 'winter storm'
newdata$EVTYPE[newdata$EVTYPE == 'winter weather'] <- 'winter storm'
newdata$EVTYPE[newdata$EVTYPE == 'winter weather mix'] <- 'winter storm'
newdata$EVTYPE[newdata$EVTYPE == 'winter weather/mix'] <- 'winter storm'
newdata$EVTYPE[newdata$EVTYPE == 'wintry mix'] <- 'winter storm'
newdata$EVTYPE[newdata$EVTYPE == 'excessive heat'] <- 'heat'
newdata$EVTYPE[newdata$EVTYPE == 'flash flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'hurricane'] <- 'hurricane/typhoon'
newdata$EVTYPE[newdata$EVTYPE == 'hurricane opal'] <- 'hurricane/typhoon'
newdata$EVTYPE[newdata$EVTYPE == 'hurricane opal/high winds'] <- 'hurricane/typhoon'
newdata$EVTYPE[newdata$EVTYPE == 'river flood'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'storm surge'] <- 'flood'
newdata$EVTYPE[newdata$EVTYPE == 'tstm wind'] <- 'tstm'

```

order data for graphs

```

sum1 <- aggregate(.~EVTYPE, data=newdata, sum)
write.csv(sum1, "sum1.csv")
T_injury <- sum1[with(sum1, order(-TotalInjury)), ]
InjuriesT <- sum1[with(sum1, order(-INJURIES)), ]
FatalatiesT <- sum1[with(sum1, order(-FATALITIES)), ]

```

```
T_cost <- sum1[with(sum1, order(-totalCost)), ]
T_farm <- sum1[with(sum1, order(-totalPROPDMG)), ]
T_property <- sum1[with(sum1, order(-totalCROPDMG)), ]
```

Results

The largest weather events to cause injury or fatality is the tornado followed by heat flood. After flood, there is a split between injuries and fatalities, with injuries have more events with tropical storm lightning and winter storm. Fatalities on the other hand has more events with lightning, rip current and the 6th place to tropical storm

Cost from weather related event hit agriculture more than personal property with hurricane/typhoon costing more, where property was more flood. Tornado ranked third followed by hail and tropical storm for each. Property rounded out with smoke/fire and thunderstorm hit agriculture more.

graph data

Figure 1: Total Injuries and Fatalities From Weather Related Disasters

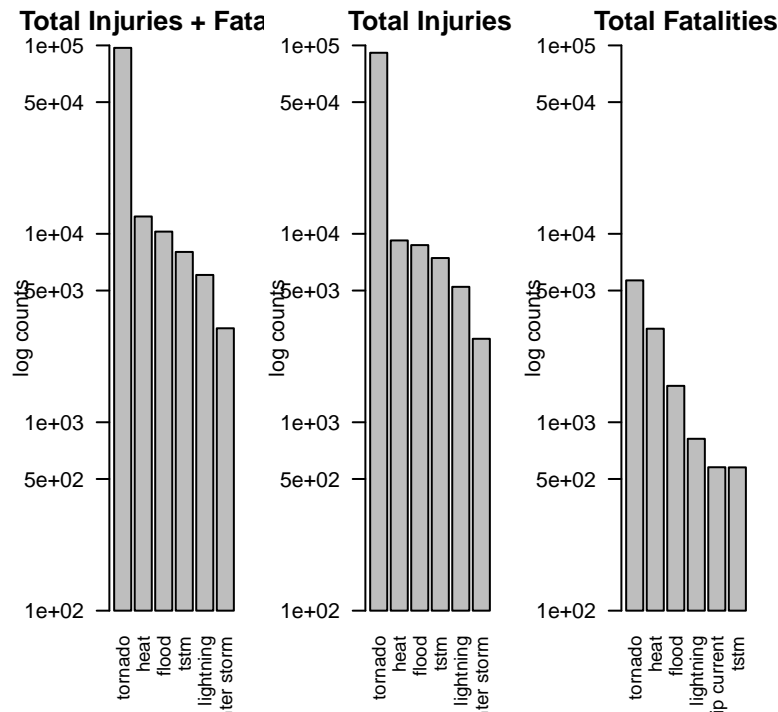


Figure 1: Total Injuries/fatalities in the US from 1950-2011

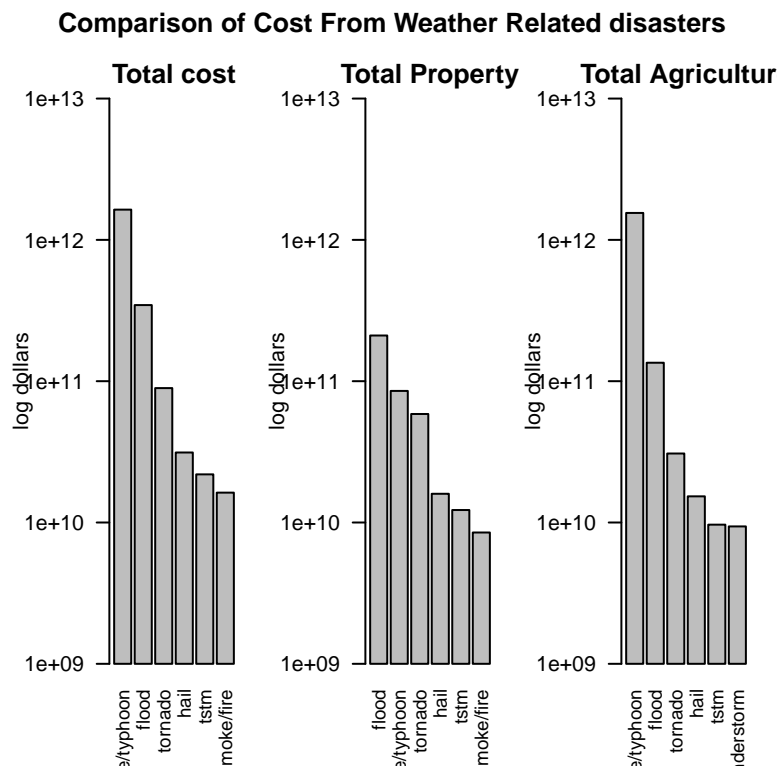


Figure 2: Total Economical Cost of weather related events from 1950-2011 in the US