# Weather events harmful to humans and causing property damage

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## SYNOPSIS

Key weather events substantially impact human health and property. To analyze this impact, data from the U.S. National Oceanic and Atmospheric Administration's (NOAA) storm database has been analyzed. From the data provided, we see that impact of weather events on human health is measured through fatalities and injuries. The biggest impact on these are heat and tornados respectively. Similarly, impact on property is measured using property and crop damage. Flash floods and droughts are the largest factors.

## DATA PROCESSING

The analysis has been performed through the following steps.

### Step1: Access storm data

The first step is to load data from NOAA into R.

```
stormData <- read.csv("repdata_data_StormData.csv.bz2")
```

### Step2: Exploratory data analysis

The dplyr package is needed for analysis and is loaded first. Then, the data is examined to get a sense of what exists and to determine the subset of information needed. After viewing the names of the columns, columns for event type, fatalities, injuries, property damage and crop damage were deemed to be sufficient for this analysis. This subsetting is the rather minimal but only data transformation performed.

```
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 3.1.3
```

```
##
## Attaching package: 'dplyr'
##
## The following object is masked from 'package:stats':
##
##     filter
##
## The following objects are masked from 'package:base':
```

```
##
##     intersect, setdiff, setequal, union
```

```
dim(stormData)
```

```
## [1] 902297     37
```

```
names(stormData)
```

```
##  [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"
```

```
stormData1 <- select(stormData, c(EVTYPE, FATALITIES, INJURIES, PROPDMG,
CROPDMG))
```

# RESULTS

## Across the United States, which types of events are most harmful with respect to population health?

The data shows that harmfulness to human health is measured in terms of fatalities and injuries.
The weather event causing the most fatalities is:

```
maxFatalites  <- tapply(stormData1$FATALITIES, stormData1$EVTYPE, max,
na.rm=TRUE)
maxFatalites[which.max(maxFatalites)]
```

```
## HEAT
##  583
```

The weather event causing the most injuries is:

```
maxInjuries  <- tapply(stormData1$INJURIES, stormData1$EVTYPE, max,
na.rm=TRUE)
maxInjuries[which.max(maxInjuries)]
```

```
## TORNADO
##    1700
```

## Across the United States, which types of events have the greatest economic consequences?

The data shows that economic consequences are measured in terms of property and crop damage.
The weather event causing the most property damage is:

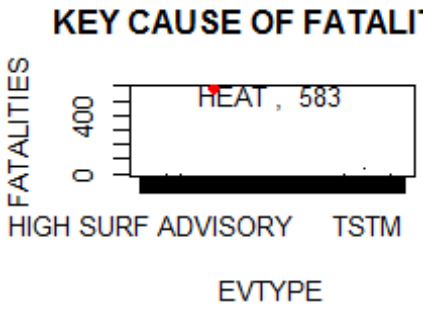
```
maxPropDmg  <- tapply(stormData1$PROPDMG, stormData1$EVTYPE, max, na.rm=TRUE)
maxPropDmg[which.max(maxPropDmg)]

## FLASH FLOOD
##        5000
```

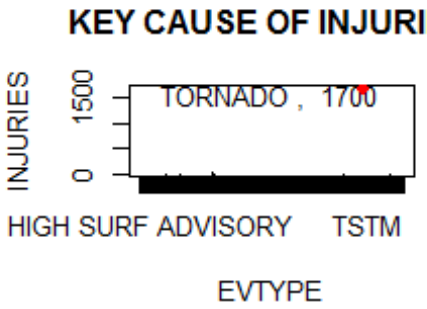
The weather event causing the most crop damage is:

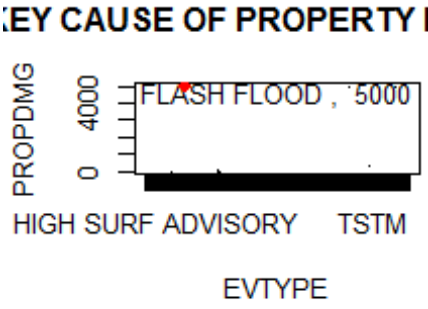
```
maxCropDmg  <- tapply(stormData1$CROPDMG, stormData1$EVTYPE, max, na.rm=TRUE)
maxCropDmg[which.max(maxCropDmg)]

## DROUGHT
##     990
```

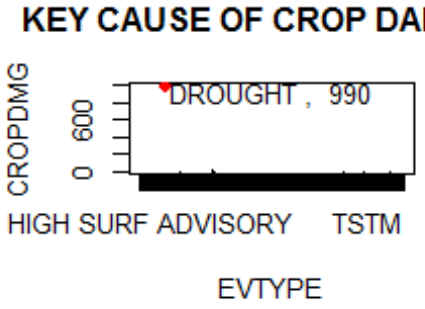
The following chart shows all this information in a single snapshot

```
stormData7 <- filter(stormData1, stormData1$FATALITIES ==
max(stormData1$FATALITIES) | stormData1$INJURIES == max(stormData1$INJURIES)
| stormData1$PROPDMG == max(stormData1$PROPDMG) | stormData1$CROPDMG ==
max(stormData1$CROPDMG))
stormData8 <- distinct(stormData7)

par(mfrow=c(2,2))
with(stormData8, {
        plot(FATALITIES~EVTYPE, main = "KEY CAUSE OF FATALITIES")
        text(x=(length(maxFatalites)/2),y=(max(maxFatalites)*.90),
labels=paste((names(which.max(maxFatalites))),", ",  max(maxFatalites)))
        points(x=which.max(maxFatalites)[[1]],y=max(maxFatalites), pch=16,
col="red")
        plot(INJURIES~EVTYPE, main = "KEY CAUSE OF INJURIES")
        text(x=(length(maxInjuries)/2),y=(max(maxInjuries)*.90),
labels=paste((names(which.max(maxInjuries))),", ",  max(maxInjuries)))
        points(x=which.max(maxInjuries)[[1]],y=max(maxInjuries), pch=16,
col="red")
        plot(PROPDMG~EVTYPE, main = "KEY CAUSE OF PROPERTY DAMAGE")
        text(x=(length(maxPropDmg)/2),y=(max(maxPropDmg)*.90),
labels=paste((names(which.max(maxPropDmg))),", ",  max(maxPropDmg)))
        points(x=which.max(maxPropDmg)[[1]],y=max(maxPropDmg), pch=16,
col="red")
        plot(CROPDMG~EVTYPE, main = "KEY CAUSE OF CROP DAMAGE")
        text(x=(length(maxCropDmg)/2),y=(max(maxCropDmg)*.90),
labels=paste((names(which.max(maxCropDmg))),", ",  max(maxCropDmg)))
        points(x=which.max(maxCropDmg)[[1]],y=max(maxCropDmg), pch=16,
col="red")
})
```


KEY CAUSE OF FATALITIES
FATALITIES
0
400
HEAT , 583
HIGH SURF ADVISORY
TSTM
EVTYPE


KEY CAUSE OF INJURIES
INJURIES
0
1500
TORNADO , 1700
HIGH SURF ADVISORY
TSTM
EVTYPE


EY CAUSE OF PROPERTY DAM
PROPDMG
0
4000
FLASH FLOOD , 5000
HIGH SURF ADVISORY
TSTM
EVTYPE


KEY CAUSE OF CROP DAMAG
CROPDMG
0
600
DROUGHT , 990
HIGH SURF ADVISORY
TSTM
EVTYPE