Public health and economic problems caused by Storms and other severe weather events

Synopsis

This data analysis pretends address the following questions:

- Across the United States, which types of events (as indicated in the EVTYPE variable) are most harmful with respect to population health?
- Across the United States, which types of events have the greatest economic consequences?

Data Processing

Firstly, we load the needed libraries and unzip the file doing the needed checks.

```
library(R.utils)
library(ggplot2)
library(plyr)
library(reshape2)

if (file.exists("repdata-data-StormData.csv.bz2") &&
        !file.exists("repdata-data-StormData.csv")) {
    bunzip2("repdata-data-StormData.csv.bz2")
}
```

Now, we load the data.

```
storm.data <- read.csv("repdata-data-StormData.csv",
stringsAsFactors=FALSE)

storm.data <- data.frame(as.Date(storm.data$BGN_DATE, "%m/%d/%Y
%H:%M:%S"),
                      storm.data$EVTYPE,
                      storm.data$FATALITIES,
                      storm.data$INJURIES,
                      storm.data$PROPDMG,
                      as.character(storm.data$PROPDMGEXP),
                      storm.data$CROPDMG,
                      as.character(storm.data$CROPDMGEXP),
                      storm.data$REFNUM)
colnames(storm.data) <- c("BGN_DATE", "EVTYPE", "FATALITIES",
"INJURIES",
                          "PROPDMG", "PROPDMGEXP", "CROPDMG",
"CROPDMGEXP","REFNUM")
```

And, finally we calculate new numeric fields as PROPCASH (combines the PROPDMG and PROPDMGEXP fields to create a numeric value), CROPCASH (combines the CROPDMG and CROPDMGEXP fields to create a numeric value) and TOTCASH (combines the PROPCASH and CROPCASH fields to create a numeric value).

```
# Do not use scientific notation
options(scipen=999)

# Mapping exponents
text.values <- c("h","H","k","K","m","M","b","B")
exp.values <- c(10^2,10^2,10^3,10^3,10^6,10^6,10^9,10^9)
map.exponents <- data.frame(text.values, exp.values)

#Calculating cash values
storm.data <- merge(map.exponents, storm.data,
                    by.x="text.values", by.y="PROPDMGEXP",
all.y=TRUE)
names(storm.data)[2] <- "prop.exponents"
storm.data$PROPCASH <- storm.data$PROPDMG *
storm.data$prop.exponents
storm.data$PROPCASH[is.na(storm.data$PROPCASH)] <- 0

storm.data <- merge(map.exponents, storm.data[,2:11],
                    by.x="text.values", by.y="CROPDMGEXP",
all.y=TRUE)
names(storm.data)[2] <- "crop.exponents"
storm.data$CROPCASH <- storm.data$CROPDMG *
storm.data$crop.exponents
storm.data$CROPCASH[is.na(storm.data$CROPCASH)] <- 0

storm.data$TOTCASH <- storm.data$PROPCASH + storm.data$CROPCASH

#cleaning data frame
storm.data <- storm.data[,c(4:7,10:13)]
```

Results

Most harmful types of events with respect to population health across the United States

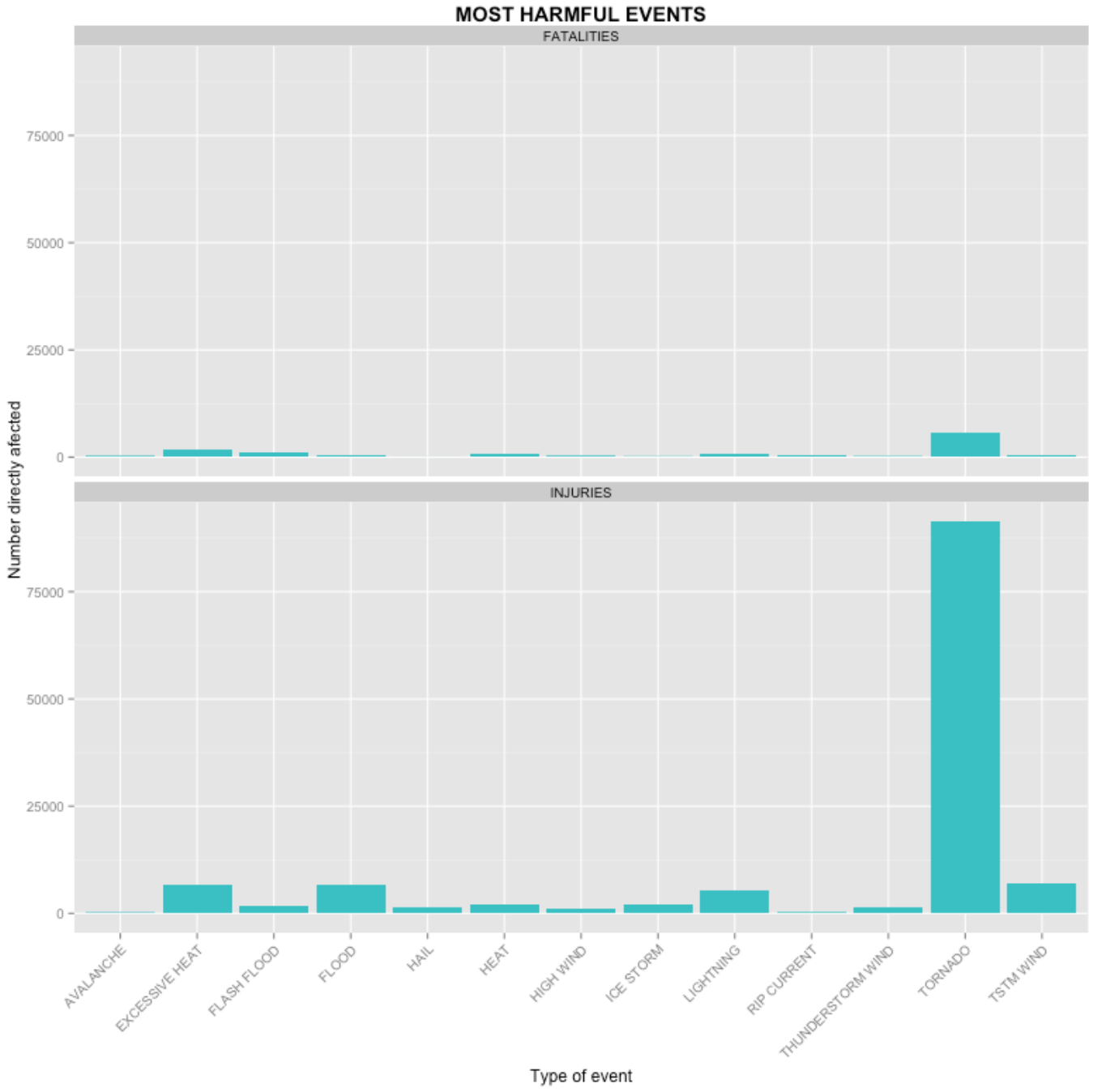
Firstly, we summarize data about fatalities and injuries by type of event. And we create a total data frame.

```
fatalities.total <- ddply(storm.data,.
(EVTYPE),summarize,FATALITIES=sum(FATALITIES, na.rm=TRUE))
injuries.total <- ddply(storm.data,.
(EVTYPE),summarize,INJURIES=sum(INJURIES, na.rm=TRUE))

total <- merge(fatalities.total, injuries.total,
                    by.x="EVTYPE", by.y="EVTYPE", all=TRUE)
```

Now, as we need only the most harmful types of events, we take only those that are greater than 99th percentile. We reshape the data, and draw the graph.

```
total <- total[total$FATALITIES > quantile(total$FATALITIES,
probs=0.99) |
                    total$INJURIES > quantile(total$INJURIES,
probs=0.99),]

summary <- melt(total, id=c("EVTYPE"),
measure.vars=c("FATALITIES","INJURIES"))
```

```
g <- ggplot(summary,
            aes(x=EVTYPE,
                y=value))
g <- g + geom_bar(fill="#00BFC4", stat="identity")
g <- g + labs(x = "Type of event")
g <- g + labs(y = "Number directly afected")
g <- g + labs(title="MOST HARMFUL EVENTS")
g <- g + facet_wrap( ~ variable, ncol=1)
g <- g + theme(plot.title = element_text(lineheight=.8,
face="bold"),
               axis.text.x=element_text(angle=45,vjust=1,hjust=1))
print(g)
```



Costliers types of events across the United States

Now, as we need only the costliers types of events, we take only those that are greater than 99th percentile.

```
economic.total <- ddply(storm.data,.
(EVTYPE),summarize,TOTCASH=sum(TOTCASH, na.rm=TRUE))

g <- ggplot(economic.total[economic.total$TOTCASH >
quantile(economic.total$TOTCASH, probs=0.99),],
            aes(x=EVTYPE,
                y=TOTCASH/10^9))
g <- g + geom_bar(fill="#00BFC4", stat="identity")
g <- g + labs(x = "Type of event")
g <- g + labs(y = "Billion Dollars")
g <- g + labs(title="COSTLIEST EVENTS")
g <- g + theme(plot.title = element_text(lineheight=.8,
face="bold"),
               axis.text.x=element_text(angle=45,vjust=1,hjust=1))
print(g)
```