Course_project2

Weather analysis of United States from the year 1950 - 2011

Synopsis: The analysis is done to predict the type of events that is the most harmful for human population as well the one which incurs the most property damage. This analysis is done using the R language in RStudio and uses some basic R packages to perform the analyses.

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. The data for this assignment come in the form of a comma-separated-value file compressed via the bzip2 algorithm to reduce its size. You can download the file from the course web site: . Storm Data [47Mb] There is also some documentation of the database available. Here you will find how some of the variables are constructed/defined. . National Weather Service Storm Data Documentation . National Climatic Data Center Storm Events FAQ The events in the database start in the year 1950 and end in November 2011. In the earlier years of the database there are generally fewer events recorded, most likely due to a lack of good records. More recent years should be considered more complete.

Data Processing:

Reading the data

Steps to read the data: - NOAA data is downloaded from Storm Data. Data is described in this document - Data is initially stored as a bz2 file on local drive - Data is unzipped first to csv using bzfile command, then the csv is read using read.csv

```
# load libraries
```

```
library(pander)
```

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

```
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 3.1.2
```

```
library(reshape2)
```

```
## Warning: package 'reshape2' was built under R version 3.1.2
```

```
# download file from internet
download.file("http://d396qusza40orc.cloudfront.net/repdata%2Fdata%2FStormData.csv.bz2", "StormData.csv.bz2")

# read the downloaded file
SD <- read.csv(bzfile("StormData.csv.bz2"), stringsAsFactors = FALSE)
```

Get a summary of the structure of the data

```
# summary of all the fields
summary(SD)
```

```
##     STATE__       BGN_DATE           BGN_TIME          TIME_ZONE
##  Min.   : 1.0   Length:902297      Length:902297      Length:902297
##  1st Qu.:19.0   Class :character   Class :character   Class :character
##  Median :30.0   Mode  :character   Mode  :character   Mode  :character
##  Mean   :31.2
##  3rd Qu.:45.0
##  Max.   :95.0
##
##      COUNTY       COUNTYNAME           STATE              EVTYPE
##  Min.   :  0.0   Length:902297      Length:902297      Length:902297
##  1st Qu.: 31.0   Class :character   Class :character   Class :character
##  Median : 75.0   Mode  :character   Mode  :character   Mode  :character
##  Mean   :100.6
##  3rd Qu.:131.0
##  Max.   :873.0
##
##    BGN_RANGE          BGN_AZI           BGN_LOCATI
##  Min.   :   0.000   Length:902297      Length:902297
##  1st Qu.:   0.000   Class :character   Class :character
##  Median :   0.000   Mode  :character   Mode  :character
##  Mean   :   1.484
##  3rd Qu.:   1.000
##  Max.   :3749.000
##
##    END_DATE           END_TIME          COUNTY_END COUNTYENDN
##  Length:902297      Length:902297      Min.   :0    Mode:logical
##  Class :character   Class :character   1st Qu.:0    NA's:902297
##  Mode  :character   Mode  :character   Median :0
```

```
##                                      Mean   :0
##                                      3rd Qu.:0
##                                      Max.   :0
##
##    END_RANGE          END_AZI           END_LOCATI
##  Min.   :  0.0000   Length:902297      Length:902297
##  1st Qu.:  0.0000   Class :character   Class :character
##  Median :  0.0000   Mode  :character   Mode  :character
##  Mean   :  0.9862
##  3rd Qu.:  0.0000
##  Max.   :925.0000
##
##      LENGTH              WIDTH                F               MAG
##  Min.   :   0.0000   Min.   :   0.000   Min.   :0.0      Min.   :    0.0
##  1st Qu.:   0.0000   1st Qu.:   0.000   1st Qu.:0.0      1st Qu.:    0.0
##  Median :   0.0000   Median :   0.000   Median :1.0      Median :   50.0
##  Mean   :   0.2301   Mean   :   7.503   Mean   :0.9      Mean   :   46.9
##  3rd Qu.:   0.0000   3rd Qu.:   0.000   3rd Qu.:1.0      3rd Qu.:   75.0
##  Max.   :2315.0000   Max.   :4400.000   Max.   :5.0      Max.   :22000.0
##                                         NA's   :843563
##    FATALITIES          INJURIES            PROPDMG
##  Min.   :  0.0000   Min.   :   0.0000   Min.   :   0.00
##  1st Qu.:  0.0000   1st Qu.:   0.0000   1st Qu.:   0.00
##  Median :  0.0000   Median :   0.0000   Median :   0.00
##  Mean   :  0.0168   Mean   :   0.1557   Mean   :  12.06
##  3rd Qu.:  0.0000   3rd Qu.:   0.0000   3rd Qu.:   0.50
##  Max.   :583.0000   Max.   :1700.0000   Max.   :5000.00
##
```

```
##   PROPDMGEXP           CROPDMG         CROPDMGEXP
##  Length:902297      Min.   :  0.000   Length:902297
##  Class :character   1st Qu.:  0.000   Class :character
##  Mode  :character   Median :  0.000   Mode  :character
##                     Mean   :  1.527
##                     3rd Qu.:  0.000
##                     Max.   :990.000
##
##      WFO             STATEOFFIC         ZONENAMES            LATITUDE
##  Length:902297      Length:902297      Length:902297      Min.   :   0
##  Class :character   Class :character   Class :character   1st Qu.:2802
##  Mode  :character   Mode  :character   Mode  :character   Median :3540
##                                                           Mean   :2875
##                                                           3rd Qu.:4019
##                                                           Max.   :9706
##                                                           NA's   :47
##    LONGITUDE        LATITUDE_E     LONGITUDE_       REMARKS
##  Min.   :-14451   Min.   :   0   Min.   :-14455   Length:902297
##  1st Qu.:  7247   1st Qu.:   0   1st Qu.:     0   Class :character
##  Median :  8707   Median :   0   Median :     0   Mode  :character
##  Mean   :  6940   Mean   :1452   Mean   :  3509
##  3rd Qu.:  9605   3rd Qu.:3549   3rd Qu.:  8735
##  Max.   : 17124   Max.   :9706   Max.   :106220
##                   NA's   :40
##      REFNUM
##  Min.   :     1
##  1st Qu.:225575
##  Median :451149
```

```
##  Mean   :451149
##  3rd Qu.:676723
##  Max.   :902297
##
```

```
# Display the structure of the data
str(SD)
```

```
## 'data.frame':    902297 obs. of  37 variables:
##  $ STATE__   : num  1 1 1 1 1 1 1 1 1 1 ...
##  $ BGN_DATE  : chr  "4/18/1950 0:00:00" "4/18/1950 0:00:00" "2/20/1951 0:00:00" "6/8/1951 0:00:00" ...
##  $ BGN_TIME  : chr  "0130" "0145" "1600" "0900" ...
##  $ TIME_ZONE : chr  "CST" "CST" "CST" "CST" ...
##  $ COUNTY    : num  97 3 57 89 43 77 9 123 125 57 ...
##  $ COUNTYNAME: chr  "MOBILE" "BALDWIN" "FAYETTE" "MADISON" ...
##  $ STATE     : chr  "AL" "AL" "AL" "AL" ...
##  $ EVTYPE    : chr  "TORNADO" "TORNADO" "TORNADO" "TORNADO" ...
##  $ BGN_RANGE : num  0 0 0 0 0 0 0 0 0 0 ...
##  $ BGN_AZI   : chr  "" "" "" "" ...
##  $ BGN_LOCATI: chr  "" "" "" "" ...
##  $ END_DATE  : chr  "" "" "" "" ...
##  $ END_TIME  : chr  "" "" "" "" ...
##  $ COUNTY_END: num  0 0 0 0 0 0 0 0 0 0 ...
##  $ COUNTYENDN: logi  NA NA NA NA NA NA ...
##  $ END_RANGE : num  0 0 0 0 0 0 0 0 0 0 ...
##  $ END_AZI   : chr  "" "" "" "" ...
##  $ END_LOCATI: chr  "" "" "" "" ...
```

```
##  $ LENGTH    : num  14 2 0.1 0 0 1.5 1.5 0 3.3 2.3 ...
##  $ WIDTH     : num  100 150 123 100 150 177 33 33 100 100 ...
##  $ F         : int  3 2 2 2 2 2 2 1 3 3 ...
##  $ MAG       : num  0 0 0 0 0 0 0 0 0 0 ...
##  $ FATALITIES: num  0 0 0 0 0 0 0 0 1 0 ...
##  $ INJURIES  : num  15 0 2 2 2 6 1 0 14 0 ...
##  $ PROPDMG   : num  25 2.5 25 2.5 2.5 2.5 2.5 2.5 25 25 ...
##  $ PROPDMGEXP: chr  "K" "K" "K" "K" ...
##  $ CROPDMG   : num  0 0 0 0 0 0 0 0 0 0 ...
##  $ CROPDMGEXP: chr  "" "" "" "" ...
##  $ WFO       : chr  "" "" "" "" ...
##  $ STATEOFFIC: chr  "" "" "" "" ...
##  $ ZONENAMES : chr  "" "" "" "" ...
##  $ LATITUDE  : num  3040 3042 3340 3458 3412 ...
##  $ LONGITUDE : num  8812 8755 8742 8626 8642 ...
##  $ LATITUDE_E: num  3051 0 0 0 0 ...
##  $ LONGITUDE_: num  8806 0 0 0 0 ...
##  $ REMARKS   : chr  "" "" "" "" ...
##  $ REFNUM    : num  1 2 3 4 5 6 7 8 9 10 ...
```

Results

1 - Most Harmful Weather Event to Population Health

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

The data contains 2 fields that describe the consequence to population health: FATALITIES and INJURIES. My analysis considers both of these metrics as indication to harming population health.

Data Processing

In the code below, I'm processing the data to report on the top 20 weather events by the total of fatalities and injuries

```
# filter top 20 to limit what's on the chart
TOPN <- 20
# aggregate the fatalities by Event Type
PHF <- aggregate(formula=FATALITIES ~ EVTYPE, data=SD, FUN=sum)
# aggregate the injuries by event type
PHI <- aggregate(formula=INJURIES ~ EVTYPE, data=SD, FUN=sum)
# merge both fatalities and injuries in one table
PHT <- merge(PHF, PHI, by="EVTYPE", all=TRUE)
# calculate the total fatalities and injuries
PHT$Total <- PHT$FATALITIES + PHT$INJURIES
# sort
topPHT <- PHT[order(-PHT$Total),]
# filter to top N
topPHT <- topPHT[1:TOPN,]
# this copy of this data is used for printing the table
topPHT_CopyForXTable <- topPHT
# remove teh total, I used this column to filter only
topPHT$Total <- NULL
# melt to have both fatalties and injuries in one column
mTopPHT <- melt(topPHT)
```

```
## Using EVTYPE as id variables
```

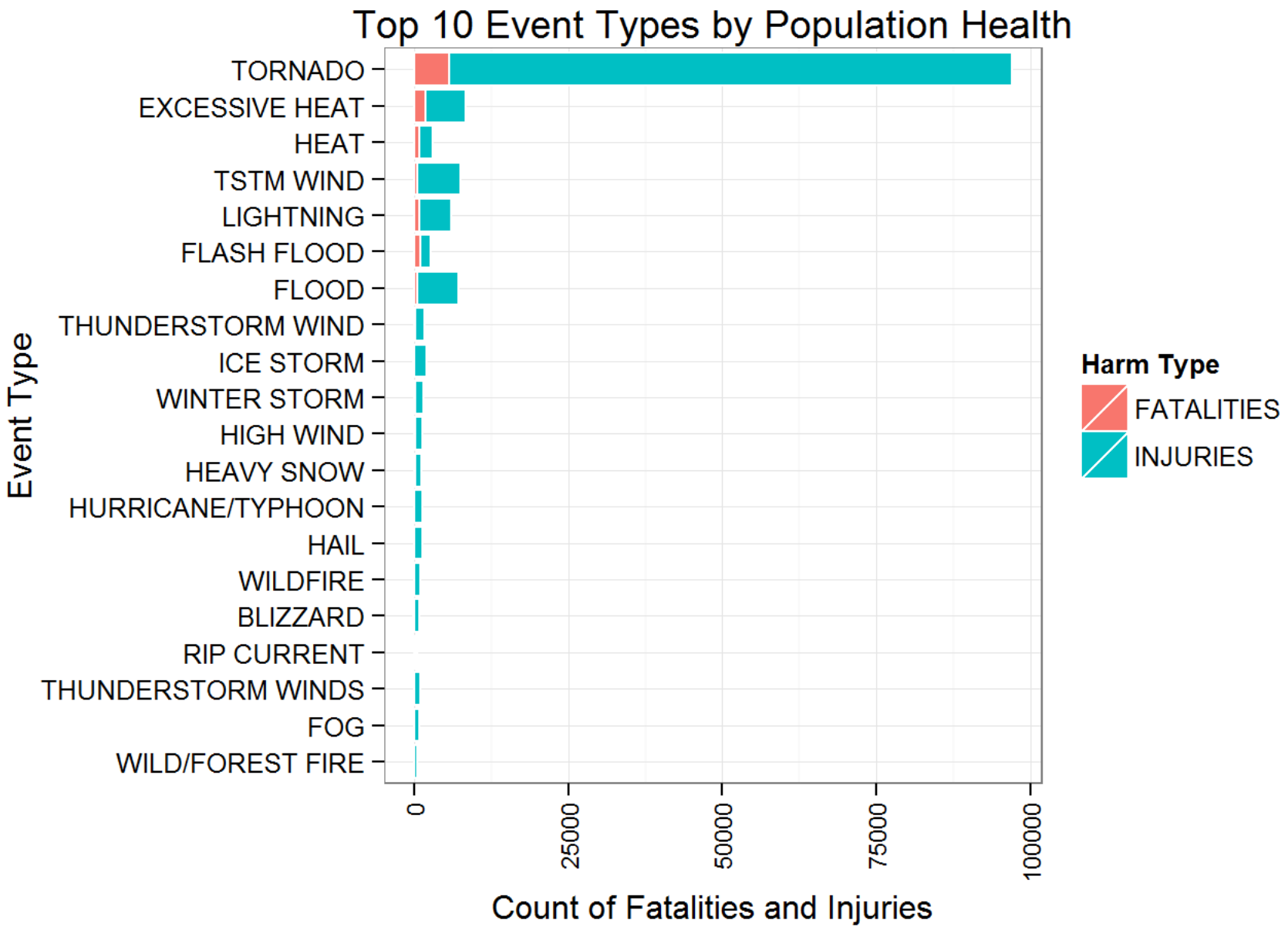
```
# reorder the EVTYPE factor by highest consequence
mTopPHT$rank <- rank(mTopPHT$value)
mTopPHT$EVTYPE <- reorder(as.factor(mTopPHT$EVTYPE), mTopPHT$rank, ordered=TRUE)
```

Reporting the Top Event Types for Fatalities and Injuries COMBINED

The chart below reports on top events by adding fatalities and injuries together

The chart demonstrates that TORNADOs are the top weather event with the highest fatalaies and injuries combined

```
# create teh chart
g <- ggplot(mTopPHT, aes(mTopPHT$EVTYPE, mTopPHT$value))
g <- g + geom_bar(stat="identity", colour="white", aes(fill=mTopPHT$variable))  + guides(fill=guide_legend(
title="Harm Type"))
g <- g + theme_bw()
g <- g +  theme(axis.text.x=element_text(angle=90,hjust=1,vjust=0.5, size=9))
g <- g + ggtitle("Top 10 Event Types by Population Health") + xlab("Event Type") + ylab("Count of Fatalitie
s and Injuries")
g <- g + coord_flip()
print(g)
```



1

```
# print the table
pandoc.table(topPHT_CopyForXTable, justify = "left", split.tables = Inf)
```

```
##
## ------------------------------------------------------------
##      EVTYPE              FATALITIES   INJURIES   Total
## --------- ------------------ ------------ ---------- -------
## **834**   TORNADO             5633         91346      96979
##
## **130**   EXCESSIVE HEAT      1903         6525       8428
##
## **856**   TSTM WIND           504          6957       7461
##
## **170**   FLOOD               470          6789       7259
##
## **464**   LIGHTNING           816          5230       6046
##
## **275**   HEAT                937          2100       3037
##
## **153**   FLASH FLOOD         978          1777       2755
##
## **427**   ICE STORM           89           1975       2064
##
## **760**   THUNDERSTORM WIND   133          1488       1621
##
## **972**   WINTER STORM        206          1321       1527
##
## **359**   HIGH WIND           248          1137       1385
##
## **244**   HAIL                15           1361       1376
```

```
##
## **411**   HURRICANE/TYPHOON  64          1275       1339
##
## **310**   HEAVY SNOW         127         1021       1148
##
## **957**   WILDFIRE           75          911        986
##
## **786**   THUNDERSTORM WINDS 64          908        972
##
## **30**    BLIZZARD           101         805        906
##
## **188**   FOG                62          734        796
##
## **585**   RIP CURRENT        368         232        600
##
## **955**   WILD/FOREST FIRE   12          545        557
## ------------------------------------------------------------
```

2 - Most Harmful Weather Event to Economic Consequences

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

Data Analysis

I'm using Property Damage combined with Crop Damage as indicator for Economic Consequences

First, I explore the unit of the dollar amount used to describe property damage and crop damage

Explore the PROPDMGEXP field

In this section, I wanted to explore the PROPDMGEXP and CROPDMGEXP fields which signifies the unit for the dollar amount.

Page 12 of the documentation mentions that: Estimates should be rounded to three significant digits, followed by an alphabetical character signifying the magnitude of the number, i.e., 1.55B for $1,550,000,000. Alphabetical characters used to signify magnitude include “K” for thousands, “M” for millions, and “B” for billions. If additional precision is available, it may be provided in the narrative part of the entry.

However, exploring the data (below) shows that PROPDMGEXP and CROPDMGEXP has more than k/K/m/M/B. Below I explored if the Remarks section has instructions of how to deal with other values of PROPDMGEXP and CROPDMGEXP

My Conclusion: After examining the records of PROPDMGEXP or CROPDMGEXP NOT equal to k/K/m/M/B, there is no information of what unit the data is in, so I will discard them from my calculations.

Explore the PROPDMGEXP field

Note that if PROPDMEXP does not equal to k/K/m/M/B, the Remarks section does not provide any indication of what the unit is.

```
# explore the values of PROPDMGEXP field
table(SD$PROPDMGEXP)
```

```
##
##             -      ?      +      0      1      2      3      4      5
## 465934      1      8      5    216     25     13      4      4     28
##      6      7      8      B      h      H      K      m      M
##      4      5      1     40      1      6 424665      7  11330
```

```r
# To find out if the remarks section contain info about the unit
rem <- subset(SD, PROPDMGEXP!="K" & PROPDMGEXP!="k" & PROPDMGEXP!="M" & PROPDMGEXP!="m" & PROPDMGEXP!="B")

# examine the remakrs for CROPDMGEXP==0
head(rem[rem$PROPDMGEXP=="0" & nchar(rem$REMARKS)>0 & rem$PROPDMG>0,"REMARKS"], n=3)
```

```
## [1] "Highest tides of the year combined with 35 mph south winds brought tide levels of 13.9 feet to the
area.  Damage was $1500.00 to the Lowell Point Road. "
## [2] "  "

## [3] "Lightning struck a house in Westminster causing a small attic fire. "
```

```r
# examine the remakrs for CROPDMGEXP==2
head(rem[rem$PROPDMGEXP=="2" & nchar(rem$REMARKS)>0 & rem$PROPDMG>0,"REMARKS"], n=3)
```

```
## [1] "Wind gusts reached 60 mph in Fulton and a mobile home was heavily damaged in the northeast part of
the county. "
```

```r
# examine the remakrs for CROPDMGEXP==?
head(rem[rem$PROPDMGEXP=="?" & nchar(rem$REMARKS)>0 & rem$PROPDMG>0,"REMARKS"], n=3)
```

```
## character(0)
```

```r
# examine the remakrs for CROPDMGEXP==""
head(rem[rem$PROPDMGEXP=="" & nchar(rem$REMARKS)>0 & rem$PROPDMG>0,"REMARKS"], n=3)
```

```
## [1] "Wind gusts to 96 mph Mt Tamalpias and 89 mph at the Golden Gate Bridge Petaluma river at Petuluma w
ent 1.6 feet over flood stage. "
## [2] "A small tornado touched down at the North Florida Prison Reception Center damaging the building bef
ore dissipating. "
## [3] "The sheriff's office reported numerous power lines and trees were down.  "
```

Explore the CROPDMGEXP field

Repeating the process of CROPDMGEXP. After examining the records below, we can safely discard the records with CROPDMGEXP that do not equal to m/M/K/k/B

```
# explore the values of CROPDMGEXP field
table(SD$CROPDMGEXP)
```

```
##
##             ?      0      2      B      k      K      m      M
## 618413      7     19      1      9     21 281832      1   1994
```

```
# get more  information about the records with CROPDMGEXP other than K /k / m / M / B
# to Find out if the remarks section contain info about the unit
rem <- subset(SD, CROPDMGEXP!="K" & CROPDMGEXP!="k" & CROPDMGEXP!="M" & CROPDMGEXP!="m" & CROPDMGEXP!="B")

# examine the remakrs for CROPDMGEXP==0
head(rem[rem$CROPDMGEXP=="0" & nchar(rem$REMARKS)>0 & rem$CROPDMG>0,"REMARKS"], n=3)
```

```
## [1] "  " " "  " " "  "
```

```
# examine the remakrs for CROPDMGEXP==2
head(rem[rem$CROPDMGEXP=="2" & nchar(rem$REMARKS)>0 & rem$CROPDMG>0,"REMARKS"], n=3)
```

```
## character(0)
```

```
# examine the remakrs for CROPDMGEXP==?
head(rem[rem$CROPDMGEXP=="?" & nchar(rem$REMARKS)>0 & rem$CROPDMG>0,"REMARKS"], n=3)
```

```
## character(0)
```

```
# examine the remakrs for CROPDMGEXP==""
head(rem[rem$CROPDMGEXP=="" & nchar(rem$REMARKS)>0 & rem$CROPDMG>0,"REMARKS"], n=3)
```

```
## [1] "  "

## [2] "Thunderstorms produced widespread large hail, accompanied by damaging winds that knocked down tree
limbs, stripped leaves from trees and knocked out power and telephone communications to San Marcos for seve
ral hours.  The hailstones broke windows in homes and school as well as Southwest State University. "

## [3] "Thunderstorms moving eastward through Medina County produced widespread wind damage.  The Red Cross
reported that 32 homes were destroyed, 44 had major damage, and 194 homes had minor damage.  Numerous mobil
e homes suffered roof and wall damage.  The city of Castroville was without power from 1639 CST until 0530
CST the next morning.  Very heavy rain accompanied the storms, reducing visibility to near zero.  Some of t
```

```
he residents reported a dark green color to the clouds just before the storm stuck.  Although no large hail was reported, the hail piled into drifts along the side of the road just west of D'Hanis.  Very little damage was reported at the Castroville Airport as most aircraft were tied down or put away at the time of the storms. "
```

Processing the data

```
# process PROPERTY DAMAGE
# aggregate per EventType and Property Damage Unit
PC <- aggregate(formula=PROPDMG ~ EVTYPE + PROPDMGEXP , data=SD, FUN=sum)
# discard records with unit not equal to k/K/M/m/B
PC <- subset(PC, PROPDMGEXP=="k" | PROPDMGEXP=="K" | PROPDMGEXP=="m" | PROPDMGEXP=="M" | PROPDMGEXP=="B" )
# tranform lower case k or m to upper case
PC$PROPDMGEXP[PC$PROPDMGEXP=="k"] <- "K"
PC$PROPDMGEXP[PC$PROPDMGEXP=="m"] <- "M"
# change the column name PROPDMGEXP to UNIT
colnames(PC)[colnames(PC)=="PROPDMGEXP"] <- "UNIT"

# process CROPS DAMAGE
CD <- aggregate(formula=CROPDMG ~ EVTYPE + CROPDMGEXP , data=SD, FUN=sum)
# discard records with unit not equal to k/K/M/m/B
CD <- subset(CD, CROPDMGEXP=="k" | CROPDMGEXP=="K" | CROPDMGEXP=="m" | CROPDMGEXP=="M" | CROPDMGEXP=="B" )
# tranform lower case k or m to upper case
CD$CROPDMGEXP[CD$CROPDMGEXP=="k"] <- "K"
CD$CROPDMGEXP[CD$CROPDMGEXP=="m"] <- "M"
# change the column name PROPDMGEXP to UNIT
colnames(CD)[colnames(CD)=="CROPDMGEXP"] <- "UNIT"
```

```
# merge both table by event type and unit
EC <- merge(PC, CD, by=c("EVTYPE", "UNIT"), all=TRUE)

# change the NA to zero
EC$PROPDMG[is.na(EC$PROPDMG)] <- 0
EC$CROPDMG[is.na(EC$CROPDMG)] <- 0

# add CROPDMG with PROPDMG
EC$DAMAGE <- EC$PROPDMG + EC$CROPDMG

# calculate the dollar amount in millions
EC$MDOLLAR <- 0 #initialization to add the column
EC$MDOLLAR[EC$UNIT=="K"] <- EC$DAMAGE[EC$UNIT=="K"] / 1000
EC$MDOLLAR[EC$UNIT=="M"] <- EC$DAMAGE[EC$UNIT=="M"]
EC$MDOLLAR[EC$UNIT=="B"] <- EC$DAMAGE[EC$UNIT=="B"] * 1000

# Aggregate to combine dollars for same event type
EC <- aggregate(formula=MDOLLAR ~ EVTYPE, data=EC, FUN=sum)

# sort EC by MDollar in Ascending order
EC <- EC[order(-EC$MDOLLAR),]
```

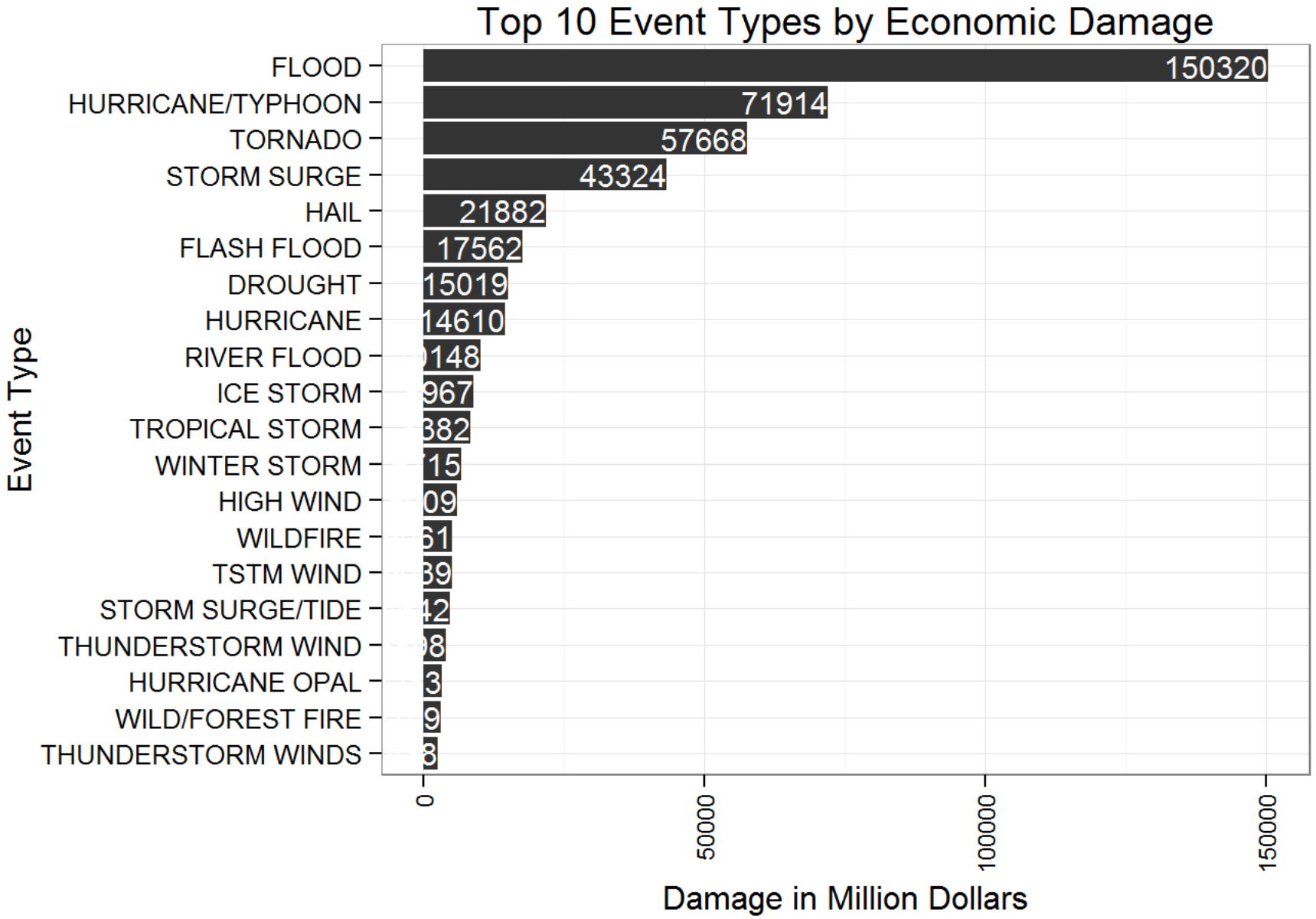
Chart the Top 20 Event Types by Economic Damage

The chart demonstrates that FLOODs are the top weather event with the most sever economic consequences.

The chart and table below display the dollar amount in millions of dollars

```r
TOPN <- 20
# change the factor order so it is ordered in the chart
EC2 <- EC[1:TOPN,]
EC2$rank <- rank(EC2$MDOLLAR)
EC2$MDOLLAR <- round(EC2$MDOLLAR,0)
EC2$EVTYPE <- reorder(as.factor(EC2$EVTYPE), EC2$rank, ordered=TRUE)

# create the chart
g <- ggplot(EC2, aes(EVTYPE, MDOLLAR))
g <- g + geom_bar(stat="identity")
g <- g + theme_bw()
#g <- g + scale_x_continuous(breaks = round(seq(min(EC2$MDOLLAR), max(EC2$MDOLLAR), by = 500),0))
g <- g +  theme(axis.text.x=element_text(angle=90,hjust=1,vjust=0.5, size=9))
#g <- g + scale_fill_hue(h=c(0,270))
g <- g + ggtitle("Top 10 Event Types by Economic Damage") + xlab("Event Type") + ylab("Damage in Million Dollars")
g <- g + geom_text(aes(label=EC2$MDOLLAR), size = 4, color="white", hjust=1)  # labels inside the bar segments
g <- g + coord_flip()
print(g)
```



2

```
## print the table.
## MDollar is millions of dollars
```

```
pandoc.table(EC[1:20,], justify = "left", split.tables = Inf)
```

```
##
## ------------------------------------
##      EVTYPE             MDOLLAR
## --------- ------------------ ---------
## **70**    FLOOD              150320
##
## **193**   HURRICANE/TYPHOON  71914
##
## **351**   TORNADO            57668
##
## **297**   STORM SURGE        43324
##
## **113**   HAIL               21882
##
## **58**    FLASH FLOOD        17562
##
## **38**    DROUGHT            15019
##
## **185**   HURRICANE          14610
##
## **259**   RIVER FLOOD        10148
##
## **202**   ICE STORM          8967
##
## **360**   TROPICAL STORM     8382
##
```

```
## **422**   WINTER STORM       6715
##
## **170**   HIGH WIND          5909
##
## **412**   WILDFIRE           5061
##
## **366**   TSTM WIND          5039
##
## **298**   STORM SURGE/TIDE   4642
##
## **311**   THUNDERSTORM WIND  3898
##
## **191**   HURRICANE OPAL     3283
##
## **410**   WILD/FOREST FIRE   3109
##
## **325**   THUNDERSTORM WINDS 2538
## ------------------------------------
```