Introduction :

The goal of the assignment is to explore the NOAA Storm Database and explore the effects of severe weather events on both population and economy.The database covers the time period between 1950 and November 2011.

The following analysis investigates which types of severe Disasters are most harmful on:

Health (injuries and fatalities) Property and crops (economic consequences) ## My Software Environment

```
sessionInfo()
```

```
## R version 4.0.1 (2020-06-06)
## Platform: x86_64-w64-mingw32/x64 (64-bit)
## Running under: Windows 10 x64 (build 18363)
## 
## Matrix products: default
## 
## locale:
## [1] LC_COLLATE=English_Indonesia.1252  LC_CTYPE=English_Indonesia.1252   
## [3] LC_MONETARY=English_Indonesia.1252 LC_NUMERIC=C                      
## [5] LC_TIME=English_Indonesia.1252    
## 
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base     
## 
## loaded via a namespace (and not attached):
##  [1] compiler_4.0.1  magrittr_1.5    tools_4.0.1     htmltools_0.4.0
##  [5] yaml_2.2.1      Rcpp_1.0.4.6    stringi_1.4.6   rmarkdown_2.2  
##  [9] knitr_1.28      stringr_1.4.0   xfun_0.14       digest_0.6.25  
## [13] rlang_0.4.6     evaluate_0.14
```

Data Processing

Loading & reading data

```
library(dplyr)
```

```
## 
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
## 
##     filter, lag
```

```
## The following objects are masked from 'package:base':
## 
##     intersect, setdiff, setequal, union
```

```
library(plyr)
```

```
## Warning: package 'plyr' was built under R version 4.0.2
```

```
## ------------------------------------------------------------------------------
```

```
## You have loaded plyr after dplyr - this is likely to cause problems.
## If you need functions from both plyr and dplyr, please load plyr first, then dplyr:
## library(plyr); library(dplyr)
```

```
## ------------------------------------------------------------------------------
```

```
## 
## Attaching package: 'plyr'
## The following objects are masked from 'package:dplyr':
##
##     arrange, count, desc, failwith, id, mutate, rename, summarise,
##     summarize
```

```
library(ggplot2)
library(reshape2)
```

```
## Warning: package 'reshape2' was built under R version 4.0.2
```

```
setwd("D:/Reproducible Research/Week4")
#fileurl <- "https://d396qusza40orc.cloudfront.net/repdata%2Fdata%2FStormData.csv.bz2"
#download.file(url = fileurl , destfile = "DataSet/repdata_data_StormData.csv")

stromdf <- read.csv("./DataSet/repdata_data_StormData.csv/repdata_data_StormData.csv")
stromdf <- stromdf[,c("EVTYPE" , "FATALITIES","INJURIES","PROPDMG","PROPDMGEXP","CROPDMG","CROPDMGEXP")]
```

Subsetting & Preprocessing Data

This is important because there’s alot things to be done , data is messy

```
TotalGrouped <- subset(stromdf , EVTYPE != '?' & (FATALITIES > 0 | INJURIES > 0 | PROPDMG > 0 | CROPDMG > 0
))

TotalGrouped$PROPDMGEXP <- toupper(TotalGrouped$PROPDMGEXP)
TotalGrouped$CROPDMGEXP <- toupper(TotalGrouped$CROPDMGEXP)
## Convert the Exponent Variables
Propdmgconv <- c("-" = 10^0, "+" = 10^0,
                 "H" = 10^2, "K" = 10^3,
                 "M" = 10^6, "B" = 10^9,
                 "0" = 10^0, "1" = 10^1,
                 "2" = 10^2, "3" = 10^3,
                 "4" = 10^4, "5" = 10^5,
                 "6" = 10^6, "7" = 10^7,
                 "8" = 10^8 ,"9" = 10^9)
Cropdmgconv <- c(
                 "?" = 10^0,"0" = 10^0,
                 "K" = 10^3,"M" = 10^4,
                 "B" = 10^9)
TotalGrouped$PROPDMGEXP[TotalGrouped$PROPDMGEXP == ""] <- 10^0
TotalGrouped$CROPDMGEXP[TotalGrouped$CROPDMGEXP == ""] <- 10^0

TotalGrouped$PROPDMGEXP <- revalue(TotalGrouped$PROPDMGEXP , Propdmgconv)
```

```
## The following `from` values were not present in `x`: 8, 9
```

```
TotalGrouped$CROPDMGEXP <- revalue(TotalGrouped$CROPDMGEXP , Cropdmgconv)
```

Calculate Total Fatalities and Injuries then Melt the top10

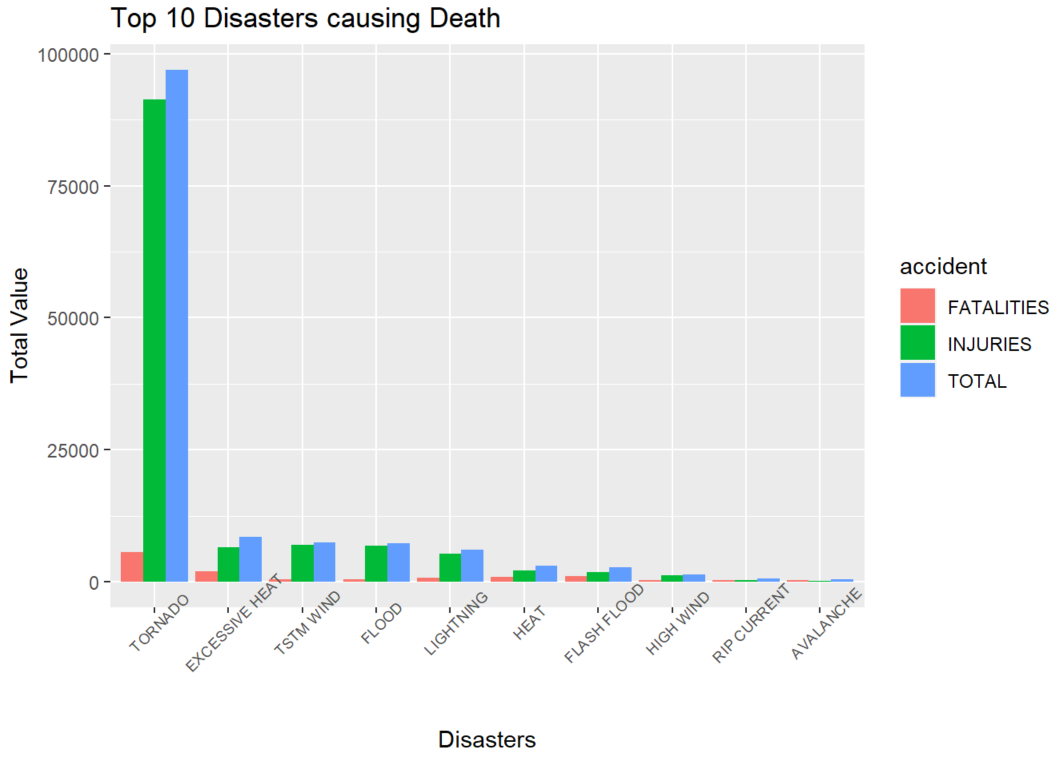
```
TotalGrouped %>%
        dplyr::group_by(EVTYPE) %>%
        dplyr::summarise(FATALITIES = sum(FATALITIES),INJURIES = sum(INJURIES),
                         TOTAL = sum(FATALITIES) + sum(INJURIES)) -> Totalaccident
```

```
## `summarise()` ungrouping output (override with `.groups` argument)
```

```
Totalaccident <- Totalaccident[order(-Totalaccident$FATALITIES),] # Sorting Values
Top10 <- head(Totalaccident , n =10)
Top10 <- reshape2::melt(data = Top10 , id.vars = c("EVTYPE") ,variable.name = "accident")
```

Plot The top 10 Dangerous Disasters

```
ggplot2::ggplot(data = Top10, aes(x = reorder(EVTYPE, -value) , y = value , fill = accident)) +
        ggplot2::geom_bar(stat = "identity" , position = 'dodge') +
        ggplot2::labs(x = "Disasters" , y = "Total Value" , title = "Top 10 Disasters causing Death") +
        ggplot2::theme(axis.text.x = element_text(angle = 45 ,size = 7))
```



So From here we know that tornado make people get injuried the most,compare others.

Economic Consiquencies

Calculate Total Prop & Crop Loss Then Melt it.

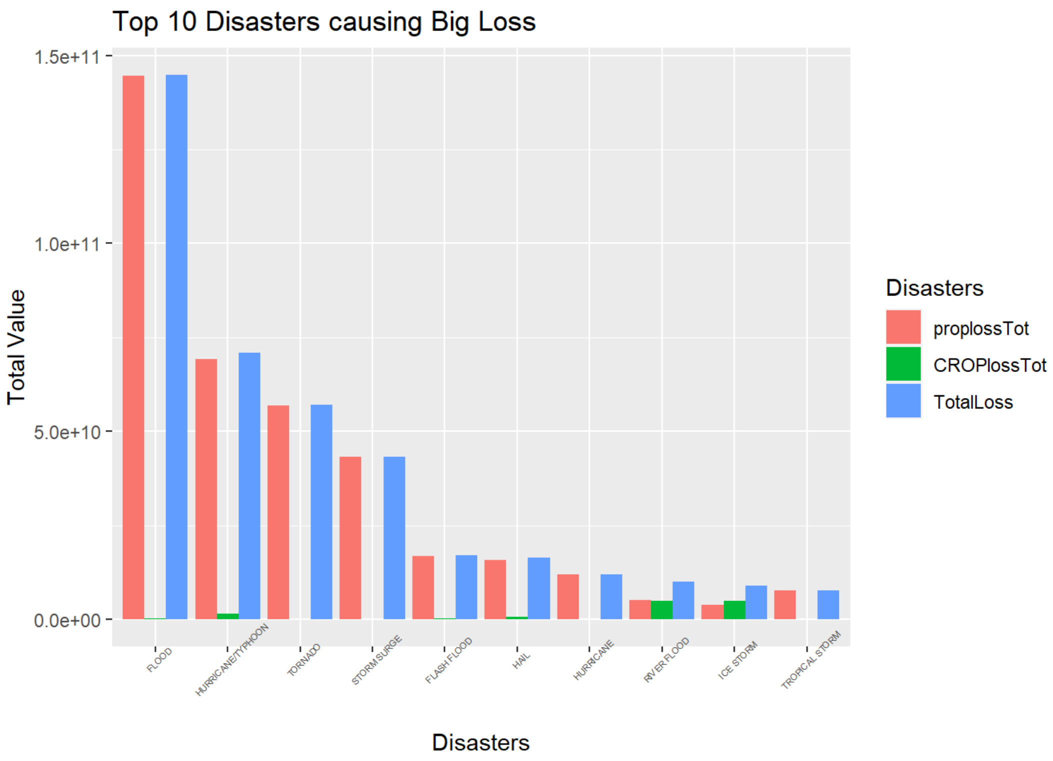
```
OverallLoss <- TotalGrouped

OverallLoss$proploss <- OverallLoss$PROPDMG * as.numeric(OverallLoss$PROPDMGEXP)
OverallLoss$croploss <- OverallLoss$CROPDMG * as.numeric(OverallLoss$CROPDMGEXP)

OverallLoss %>%
        dplyr::group_by(EVTYPE) %>%
        dplyr::summarise(proplossTot = sum(proploss) ,
                 CROPlossTot = sum(croploss) ,
                 TotalLoss = sum(proplossTot) + sum(CROPlossTot))  -> OverallLoss
```

```
## `summarise()` ungrouping output (override with `.groups` argument)
```

```
OverallLoss <- OverallLoss[order(-OverallLoss$TotalLoss) , ]
Top10Loss <- head(OverallLoss , 10)
Top10Loss <-reshape2::melt(data = Top10Loss , id.vars = c('EVTYPE'),variable.name = "Disasters")
```

Plot The Top 10 Dangerous Disasters for Economic

```
ggplot2::ggplot(data = Top10Loss , aes(x = reorder(EVTYPE , -value) , y =value ,fill = Disasters )) +
        ggplot2::geom_bar(stat = "identity" , position = "dodge" ,) +
        ggplot2::labs(x = "Disasters" , y = "Total Value" , title = "Top 10 Disasters causing Big Loss")+
        ggplot2::theme(axis.text.x = element_text(angle = 45 , size = 4))
```



Result / Conclusion

We see that tornadoes cause more fatalities and injuries in a rate that is significantly greater than the rest of Disasters. Tornadoes are most harmful to population health in this dataset.

it is obvious that Flood is the most destructive weather events for economic consequences, as documented in the data.It’s greatly impact economic consequences compare others disasters.