Extended Mapping Assignment

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Importing Data

The dataset used in this project is from FEMA.

```r
d1 = read.csv("PublicAssistanceFundedProjectsDetails.csv")
```

Data Cleaning

```r
# filter the data from 2009 to 2018 and select related columns
d1 = separate(col = declarationDate, into = c("declarationYear","others"), sep = "-", remove = FALSE, da
d2 = select(d1, c(3,5,8,9,13,15,17,18,19,20))
d3 = d2 %>% filter(d2$declarationYear %in% c(2009:2018))
d4 = filter(d3, incidentType=="Hurricane")
```

```r
#checking for NA values
length(which(!is.na(d4)=="FALSE"))
```

```
## [1] 0
```

EDA

```r
# estimate total cost due to hurricane
p1 = aggregate(projectAmount~declarationYear, data = d4, FUN = sum)
p1$declarationYear = as.numeric(p1$declarationYear)

ggplot(data=p1, aes(x = factor(declarationYear), y = projectAmount)) +
  geom_bar(stat = "identity") +
  labs(x = "Year", y = "Estimated Total Cost in dollars", title = "2009-2018 Estimated Total Cost by Hur
```

2009–2018 Estimated Total Cost by Hurricane
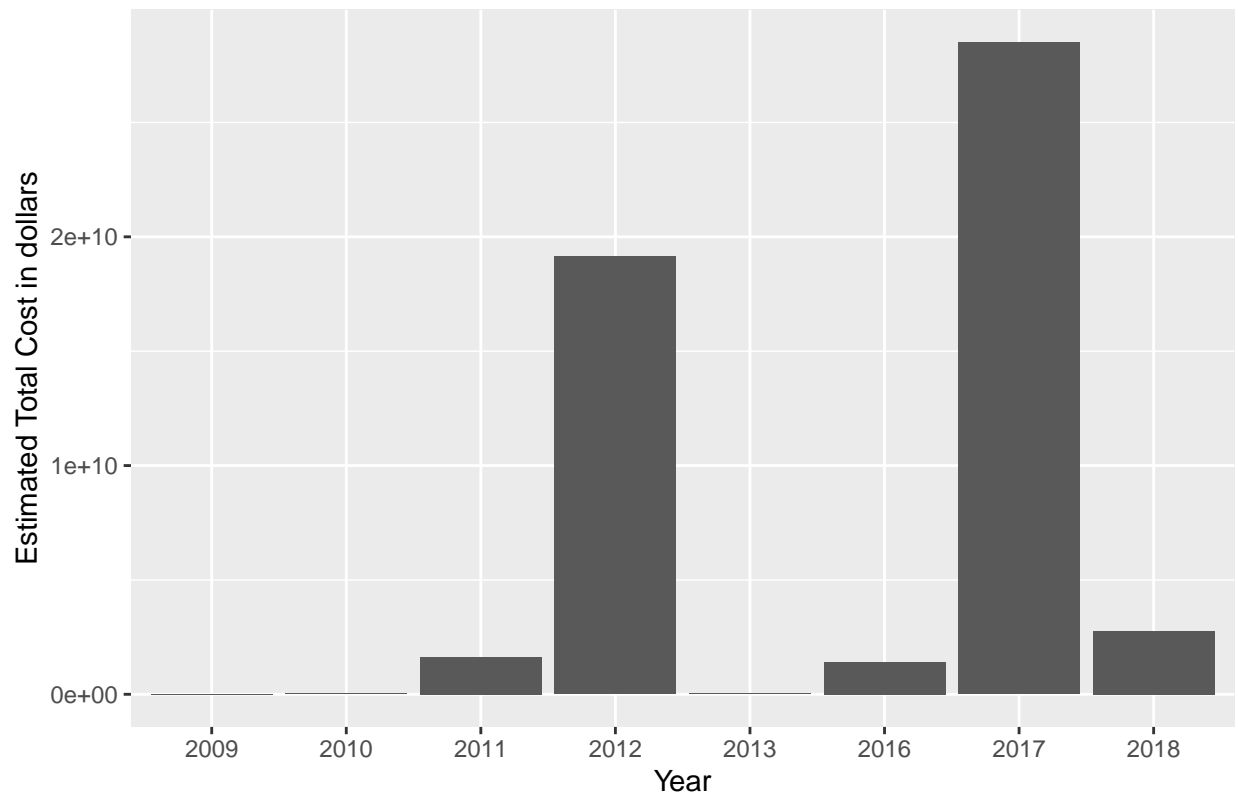

```r
# The Public Assistance grant funding
p2 = aggregate(federalShareObligated~declarationYear, data = d4, FUN = sum)
p2$declarationYear = as.numeric(p2$declarationYear)

ggplot(data=p2, aes(x = factor(declarationYear), y = federalShareObligated)) +
  geom_bar(stat = "identity") +
  labs(x = "Year", y = "The Public Assistance Grant Funding in dollars", title = "2009-2018 The Public A
```
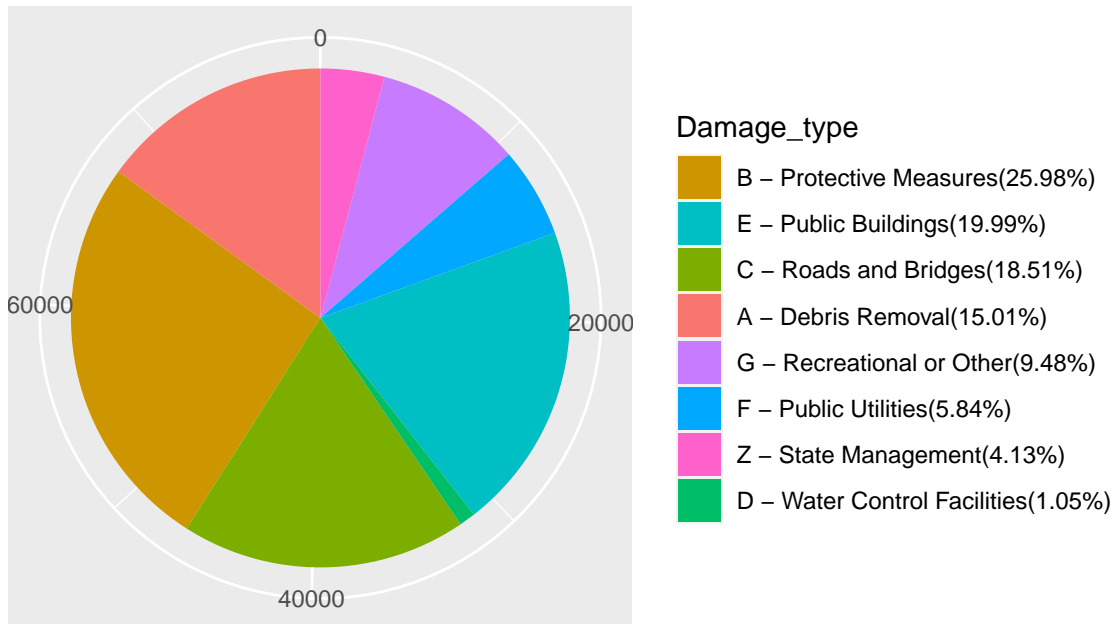
2009–2018 The Public Assistance grant funding to Hurricane
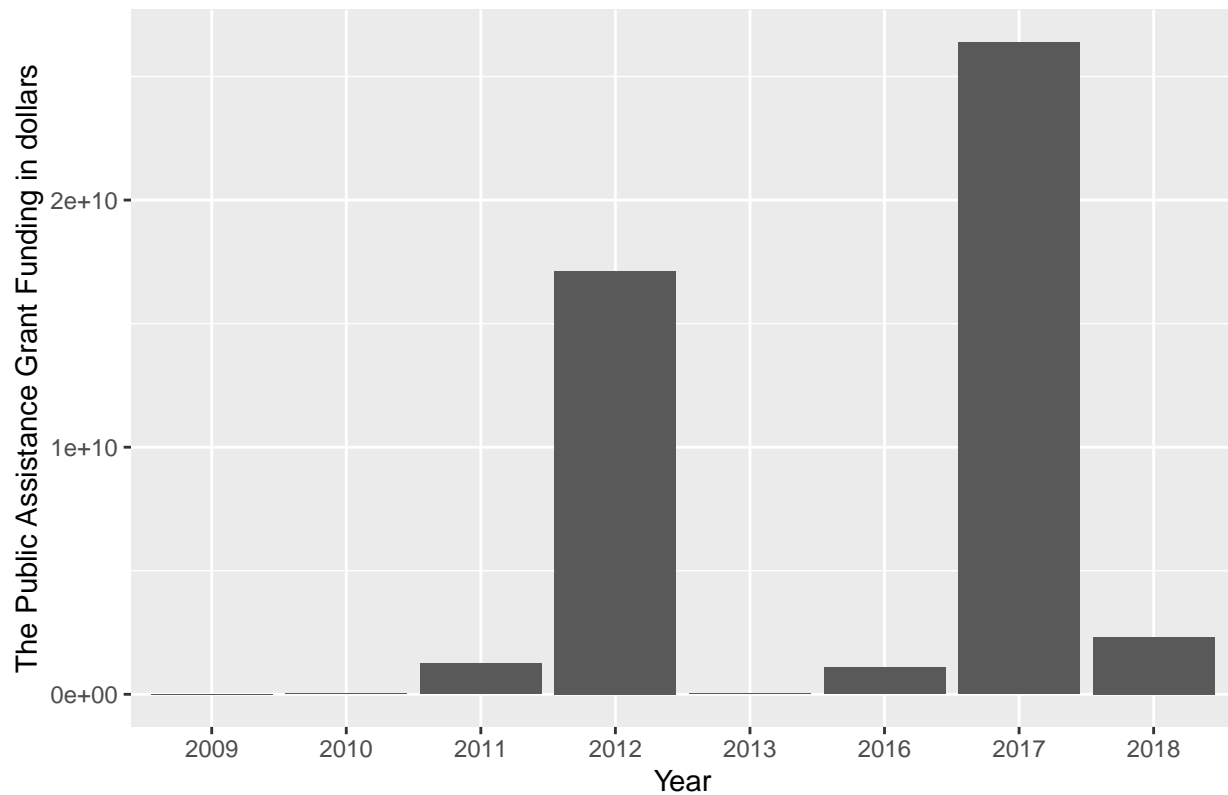

```r
# Proportions of Different Damage Categories
t1 = data.frame(table(d4$damageCategoryCode))
t1 = rename(t1, "Damage_type" = "Var1")
t1 = t1[order(t1$Freq, decreasing = TRUE),]
label = as.vector(t1$Damage_type)
label = paste(label, "(", round(t1$Freq / sum(t1$Freq) * 100, 2), "%)        ", sep = "")

ggplot(t1, aes(x = "", y = Freq, fill = Damage_type)) +
  geom_bar(width = 1, stat = "identity") +
  coord_polar("y", start = 0) +
  theme(axis.ticks = element_blank()) +
  labs(x = "", y = "", title = "Proportions of Different Damae Categories") +
  scale_fill_discrete(breaks = t1$Damage_type, labels = label)
```

Proportions of Different Damae Categories

Damage_type

- B – Protective Measures(25.98%)
- E – Public Buildings(19.99%)
- C – Roads and Bridges(18.51%)
- A – Debris Removal(15.01%)
- G – Recreational or Other(9.48%)
- F – Public Utilities(5.84%)
- Z – State Management(4.13%)
- D – Water Control Facilities(1.05%)

Mapping

```r
#Estimate Total Cost
a1 = aggregate(projectAmount~county, data = d4, FUN = sum)
a2 = aggregate(applicantId~county, data = d4, FUN = unique)
a2$number = lengths(a2$applicantId)
m1 = merge(a1, a2)
for (i in 1:nrow(m1)){
  m1$subregion[i] = tolower(m1$county[i])
}
m1 = select(m1, -c(1,3))
geo = map_data("county")
state = map_data("state")
geo1 = right_join(geo, m1, by = c('subregion'='subregion'))
```

```r
ggplot() +
  ggtitle("Estimated Total Cost") +
  geom_polygon(data = geo, aes(x = long, y = lat, group = group), color = "grey", fill = "white") +
  geom_polygon(data = geo1, aes(x = long, y = lat, group = group, fill = projectAmount), color = "grey"
  labs(x = "Longtitude", y = "Latitude", fill = "Estimated Total Cost")+
  geom_polygon(data = state, aes(x = long, y = lat, group = group), color="black", fill = "lightgray", s
```

Estimated Total Cost
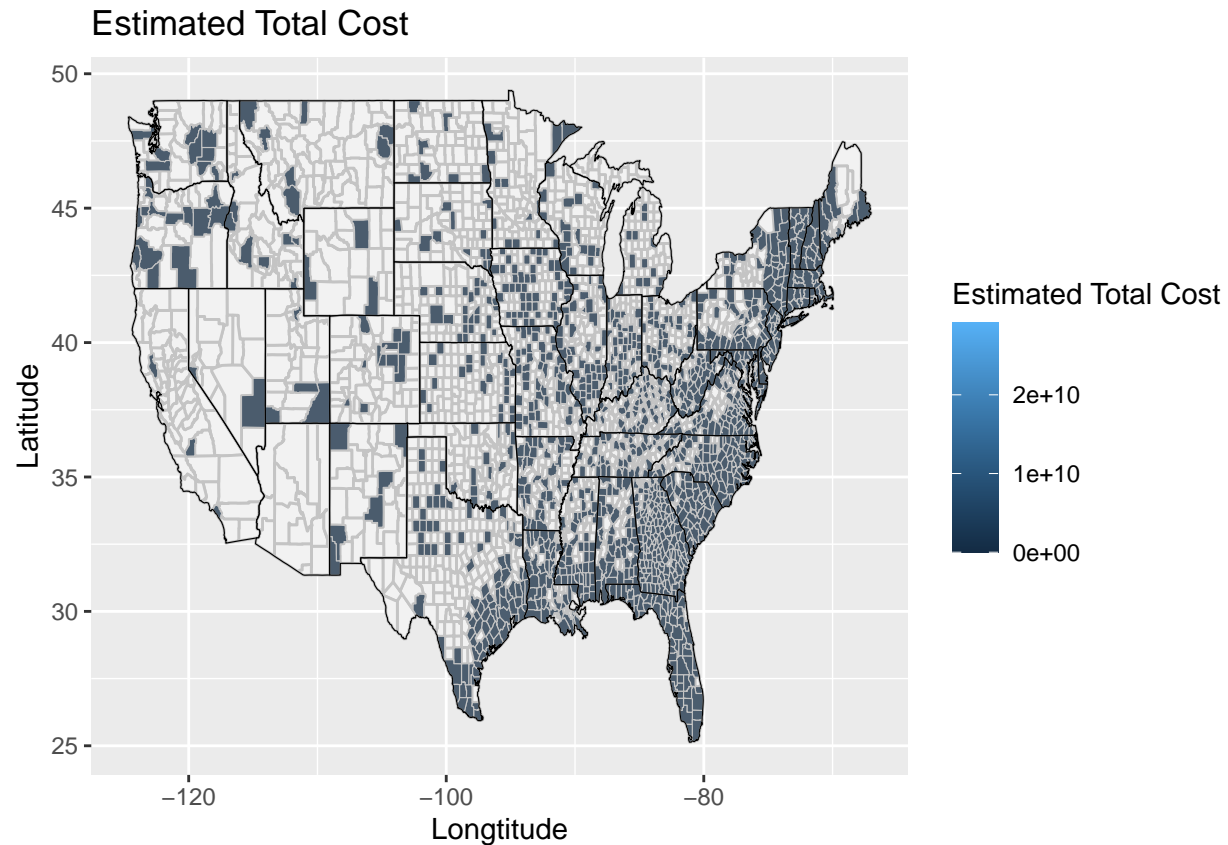

```r
# The Public Assistance grant funding
a3 = aggregate(federalShareObligated~county, data = d4, FUN = sum)
a2$number = lengths(a2$applicantId)
m2 = merge(a3, a2)
for (i in 1:nrow(m2)){
  m2$subregion[i] = tolower(m2$county[i])
}
m2 = select(m2, -c(1,3))
geo = map_data("county")
state = map_data("state")
geo2 = right_join(geo, m2, by = c('subregion'='subregion'))
```

```r
ggplot() +
  ggtitle("The Public Assistance grant funding") +
  geom_polygon(data = geo, aes(x = long, y = lat, group = group), color = "grey", fill = "white") +
  geom_polygon(data = geo2, aes(x = long, y = lat, group = group, fill = federalShareObligated), color =
  labs(x = "Longtitude", y = "Latitude", fill = "Public Assistance grant funding")+
  geom_polygon(data = state, aes(x = long, y = lat, group = group), color="black", fill = "lightgray",
```

The Public Assistance grant funding