Mapping assignment

Lin Zhou

2020/10/29

```r
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.0 --
```

```
## v ggplot2 3.3.2     v purrr   0.3.4
## v tibble  3.0.4     v dplyr   1.0.2
## v tidyr   1.1.2     v stringr 1.4.0
## v readr   1.4.0     v forcats 0.5.0
```

```
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```r
library(drat)
library(ggplot2)
library(hurricaneexposuredata)
library(hurricaneexposure)
library(maps)
```

```
##
## Attaching package: 'maps'
```

```
## The following object is masked from 'package:purrr':
##
##     map
```

```r
#Data preparation
MainStates <- map_data("state")
AllCounty <- map_data("county")
data("hurr_tracks")
data("rain")
floyd_h<- filter(hurr_tracks, storm_id=="Floyd-1999")
allison_h <- filter(hurr_tracks, storm_id=="Allison-2001")
floyd_r <- filter(rain, storm_id=="Floyd-1999")
allison_r <- filter(rain, storm_id=="Allison-2001")
f1 <- group_by(floyd_r,fips,storm_id)
f2 <- summarise(f1, precip_sum = sum(precip), .groups = "drop")
fips <- county.fips
fips$fips <- str_pad(fips$fips,5,side = "left",pad = "0")
f3 <- merge(f2,fips, by="fips")
f4 <- separate(f3, polyname, sep = ",", into = c("region","subregion"))
states <- c("texas","oklahoma","kansas","louisiana","arkansas","missouri","iowa",
            "wisconsin","michigan","illinois","indiana","ohio","kentucky","tennessee",
            "alabama","mississippi","florida","georgia","south carolina","north carolina",
            "virginia","west virginia","maryland","delaware","pennsylvania","new jersey",
```

```
              "new york","connecticut","rhode island","massachusetts","vermont",
              "new hampshire","maine")
map_states <- map_data("county", states)
#Find common region
f5 <- merge(f4,map_states, by = c("region","subregion"))
f5$phase <- cut(f5$precip_sum,breaks=c(0,75,150,225),include.lowest = T)
#Floyd-1999 hurricane data = floyd_h
#Floyd-1999 rainfall data = f5
#Mapping with ggplot2
ggplot()+
  geom_polygon(f5, mapping=aes(x = long, y = lat, group = group, fill = phase))+
  geom_path(map_states, mapping=aes(x = long, y = lat, group = group),color="black")+
  geom_path(floyd_h, mapping = aes(x = longitude, y = latitude),color="red")+
  scale_fill_brewer(palette="Blues")+
  xlab("Longtitude")+ ylab("Latitude")+
  ggtitle("Floyd-1999")+
  labs(fill="Rainfall (mm)")+
  theme(plot.title = element_text(hjust = 0.5, size = 20))
```


Floyd−1999
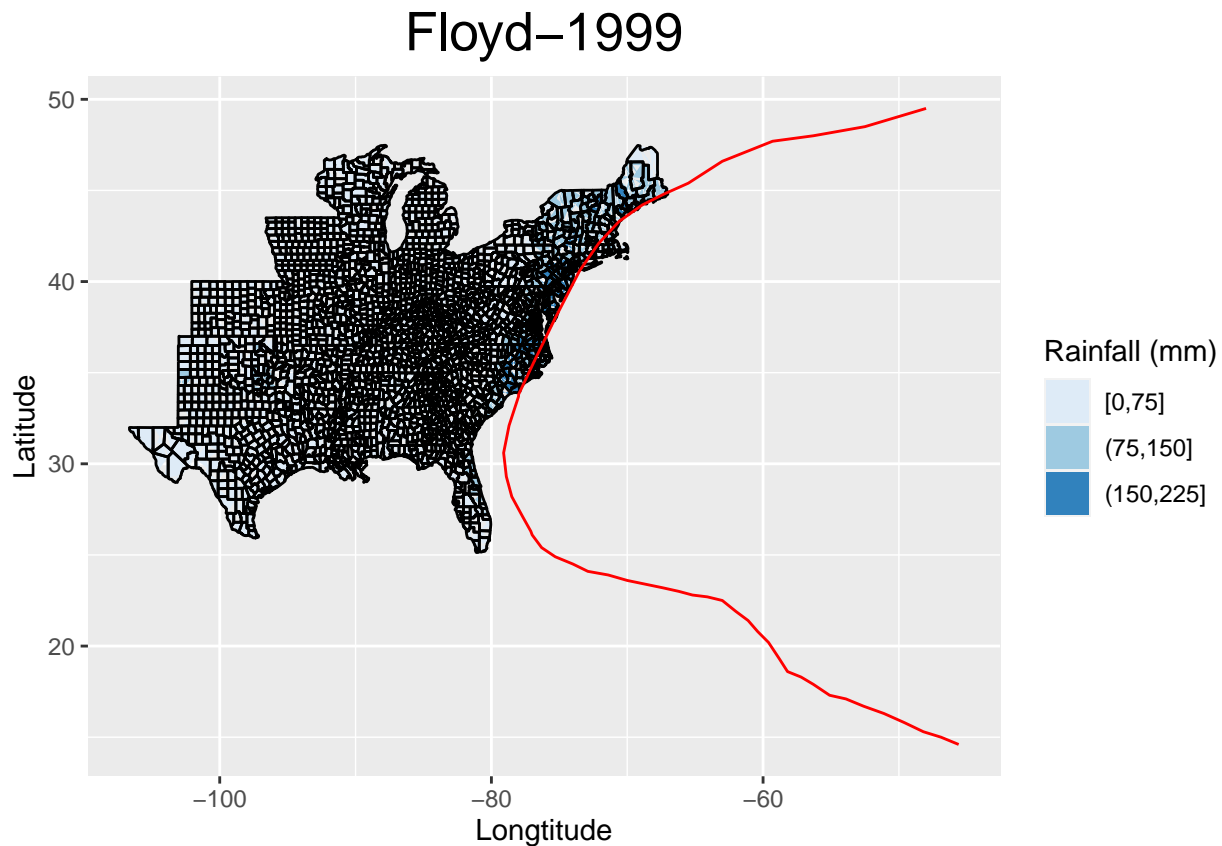
```
a1 <- group_by(allison_r,fips,storm_id)
a2 <- summarise(a1, precip_sum = sum(precip), .groups = "drop")
a3 <- merge(a2,fips, by="fips")
a4 <- separate(a3, polyname, sep = ",", into = c("region","subregion"))
a5 <- merge(a4,map_states, by = c("region","subregion"))
a5$phase <- ifelse(a5$precip_sum < 175,"Unexposed","Exposed")
#Allison-2001 hurricane data = allison_h
#Allison-2001 rainfall data = a5
```

```
ggplot()+
  geom_polygon(a5, mapping=aes(x = long, y = lat, group = group, fill = phase))+
  geom_path(map_states, mapping=aes(x = long, y = lat, group = group),color="black")+
  geom_path(allison_h, mapping = aes(x=longitude, y=latitude),color="red")+
  xlab("Longtitude")+ylab("Latitude")+
  ggtitle("Allison-2001")+
  labs(fill="Rain >175 mm")+
  theme(plot.title = element_text(hjust = 0.5, size = 20))
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <88>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <92>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <88>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <92>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <88>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <92>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <88>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <92>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <88>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <92>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <88>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <92>
```
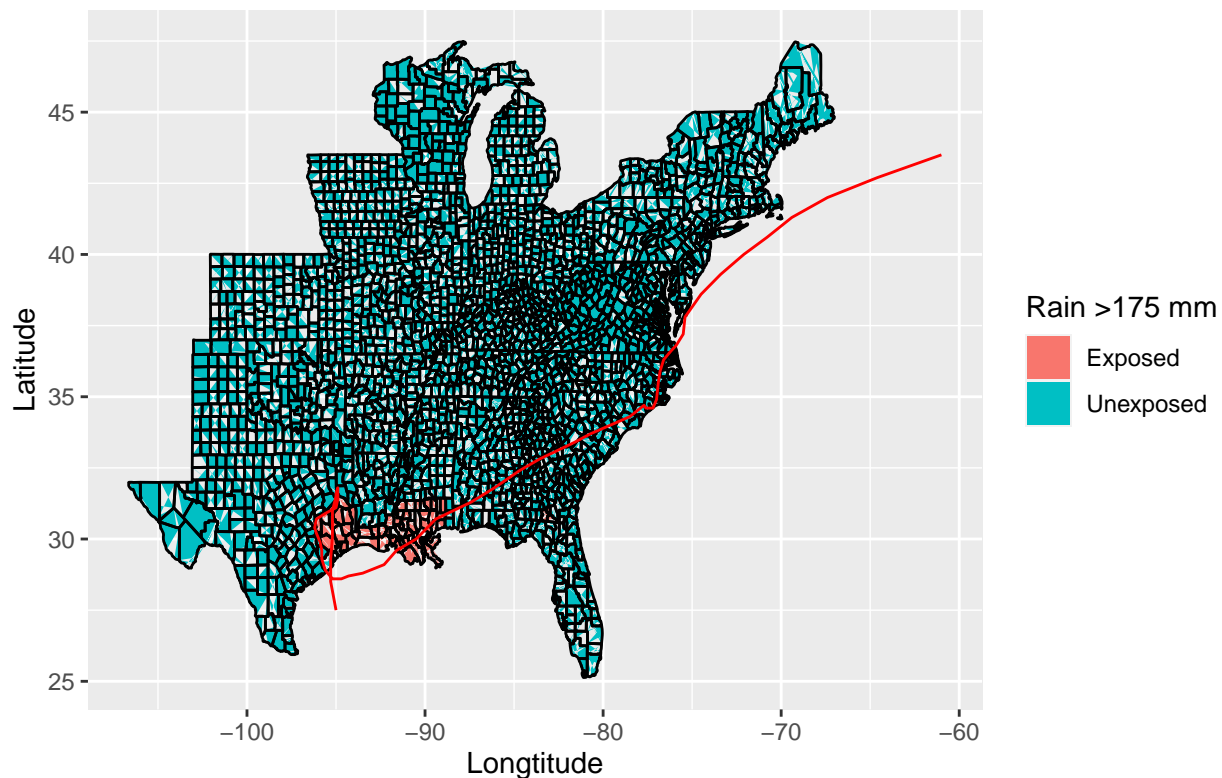
```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <88>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <92>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <88>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on 'Allison-2001' in 'mbcsToSbcs': dot substituted for <92>
```



```
library(tmap)
library(sf)
```

```
## Linking to GEOS 3.8.1, GDAL 3.1.1, PROJ 6.3.1
```

```
library(sp)
library(viridis)
```

```
## Loading required package: viridisLite
```

```
#convert map_states into sf.
sf_map <- st_as_sf(map("county",states,plot=F,fill=T))
tf5 <- f5 %>%
```

```
  select(region, subregion, phase) %>%
  mutate(ID=str_c(region,subregion,sep = ",")) %>%
  select(ID,phase) %>%
  rename("Rainfall(mm)"= phase)
tf5 <- left_join(tf5 ,sf_map, by="ID")
sftf5 <- st_as_sf(tf5)
tfloyd_h <- cbind(floyd_h$longitude, floyd_h$latitude) %>%
  Line() %>% Lines(ID='Floyd-1999') %>%
  list() %>% SpatialLines()
#mapping with tmap
tm_shape(sftf5)+
  tm_polygons(border.col="black",lwd=1, col ="Rainfall(mm)", style="cat", title="Rainfall(mm)", palette=
  tm_shape(tfloyd_h)+
  tm_lines(col = "red")+
  tm_layout(main.title='Floyd-1999',main.title.position="center",main.title.size = 2)
```
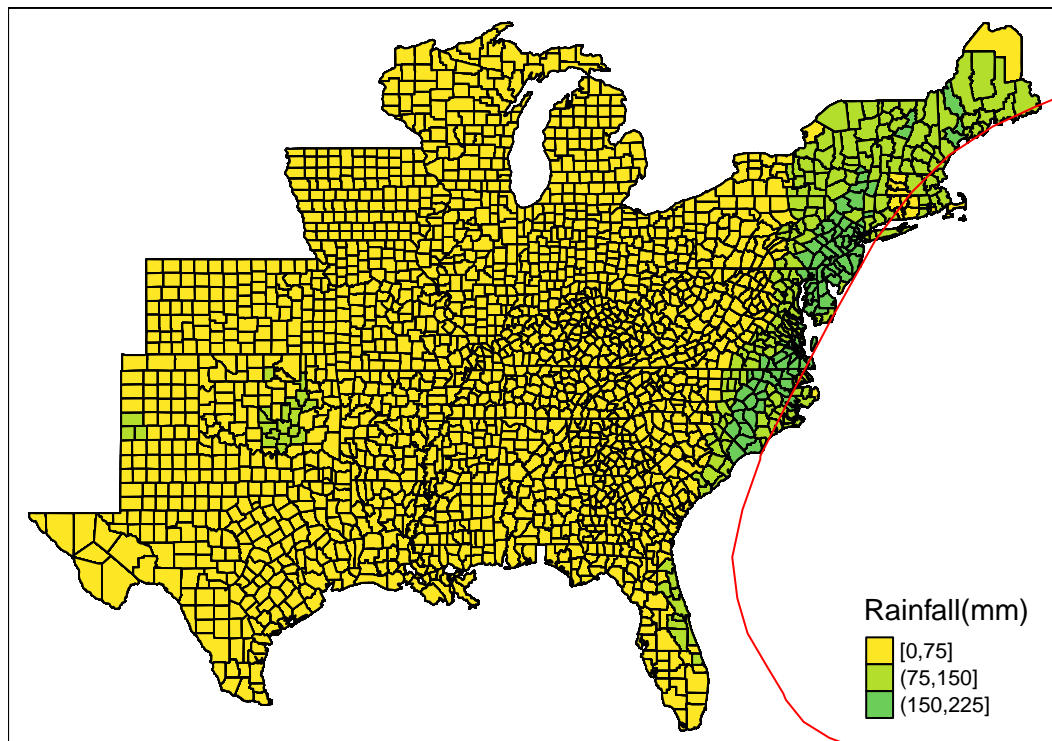
```
## Warning: Currect projection of shape tfloyd_h unknown. Long-lat (WGS84) is
## assumed.
```

Floyd–1999


```
ta5 <- a5 %>%
  select(region, subregion, phase) %>%
  mutate(ID=str_c(region,subregion,sep = ",")) %>%
  select(ID,phase) %>%
  rename("Rainfall(mm)"= phase)

ta5 <- left_join(ta5 ,sf_map, by="ID")
sfta5 <- st_as_sf(ta5)
tallison_h <- cbind(allison_h$longitude, allison_h$latitude) %>%
```

```
  Line() %>% Lines(ID="Allison-2001") %>%
  list() %>% SpatialLines()
tm_shape(sfta5,title="Floyd-1999")+
  tm_polygons("Rainfall(mm)",palette=c("pink","yellow"),title="Rain > 175 mm")+
  tm_shape(tallison_h)+
  tm_lines(col='red4',lwd=1.2)+
  tm_style("watercolor")+
  tm_layout(main.title='Allison-2001')
```

```
## Warning: Currect projection of shape tallison_h unknown. Long-lat (WGS84) is
## assumed.
```

Allison−2001