Utah Car Accidents Data and Code

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Load Libraries and Data file

```
# For Data Cleaning and Visualization
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("tigris")
```

```
## To enable
## caching of data, set `options(tigris_use_cache = TRUE)` in your R script or .Rprofile.
```

```
library("ggplot2")
library("sf")
```

```
## Linking to GEOS 3.9.1, GDAL 3.4.0, PROJ 8.1.1; sf_use_s2() is TRUE
```

```
# For AOI and climateR
library('lattice')
library("raster")
```

```
## Loading required package: sp
```

```
##
## Attaching package: 'raster'
```

```
## The following object is masked from 'package:dplyr':
##
##     select
```

```
library("rasterVis")
library("AOI")
```

```
##
## Attaching package: 'AOI'
```

```
## The following object is masked from 'package:tigris':
##
##     list_states
```

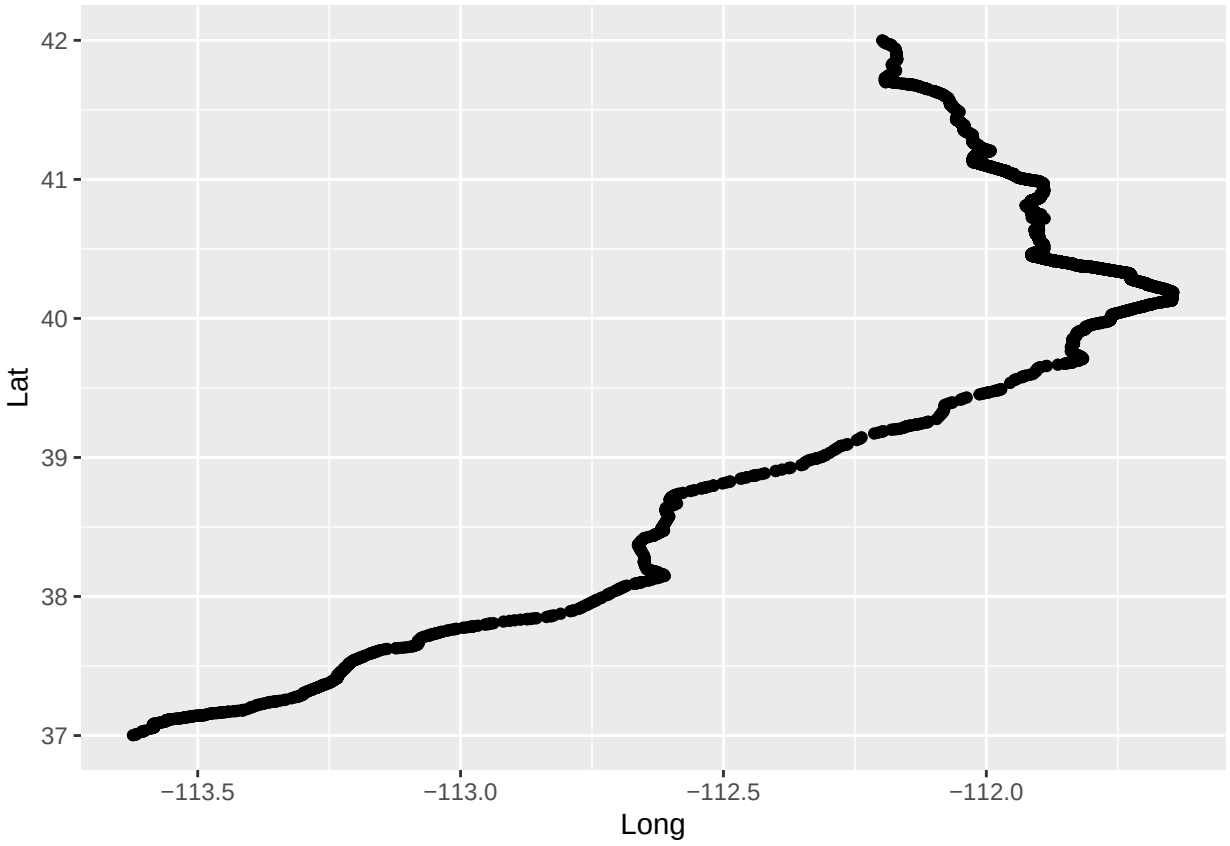
```r
library("climateR")

crash <- read.csv("../data-raw/RawCrashData2020.csv")
```

Data Prepping

Car Accidents

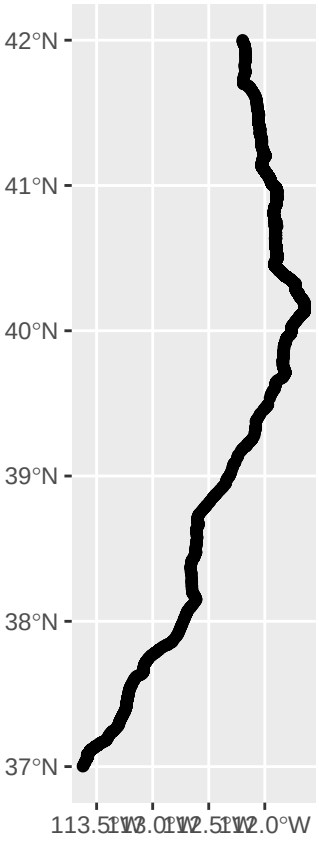
```r
# subset to retain only potentially useful information
# Route: I-15 Highway route
# milepoint: Milepoint of accident
# Coords: Lat and Long

crash_i15 <- crash %>%
  dplyr::select(.,Route,Milepoint,Lat,Long) %>%
  dplyr::filter(Route == "0015")
```

```r
# Basic plot of points of accidents
ggplot()+
  geom_point(data = crash_i15,
             aes(x = Long, y = Lat))
```




```r
# Sf with NAD83 matches CRS of Utah map and Roads
i15_spat <- sf::st_as_sf(x = crash_i15,
                         coords = c( "Long", "Lat"),
                         crs = 4269)
```

```
# Plot of spatial object crashes
crash_plot <- ggplot(i15_spat) +
  geom_sf()
crash_plot
```



Roads

https://www2.census.gov/geo/pdfs/maps-data/data/tiger/tgrshp2020/TGRSHP2020_TechDoc.pdf

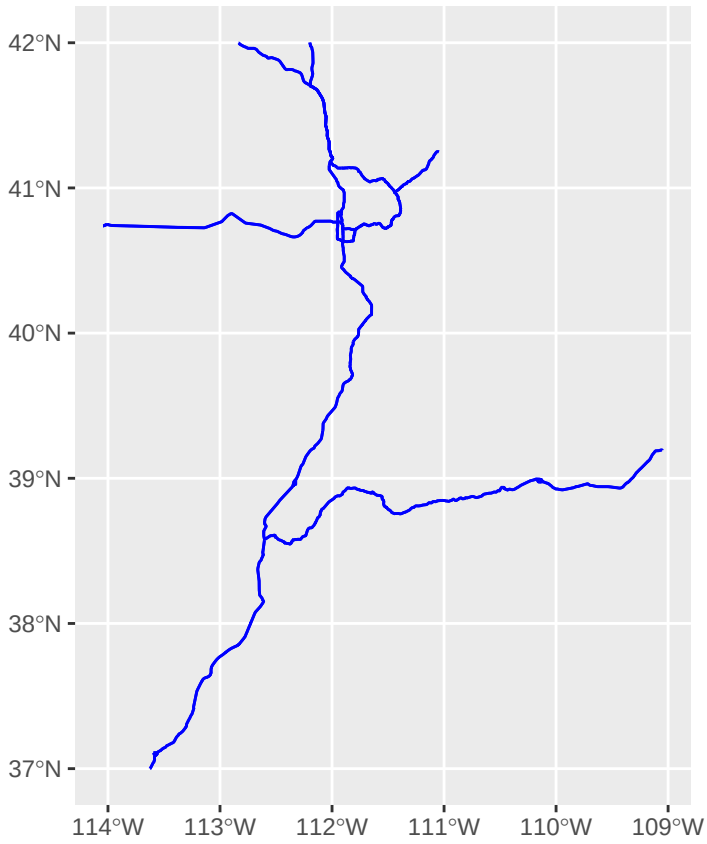
Link: Census.gob information on Tigris shapefiles

Important: Original CRS = NAD83

```
# subset of Interstates in Utah
roads <- tigris::primary_secondary_roads("Utah") %>%
  dplyr::filter(RTTYP %in% c('I'))
```

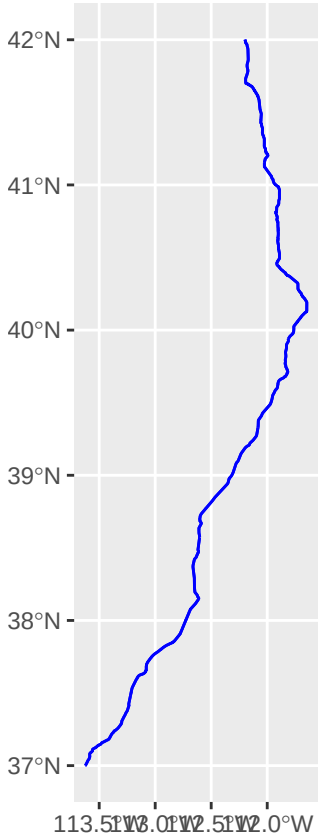
```
##   |                                                                      |
```

```
# plot of ALL Interstates in Utah (Utah not fitted)
ggplot()+
  geom_sf(data = roads,
          color = 'blue',
          aes(geometry = geometry))
```




```
# subset of I-15 and convert to MultiLineString
roads_i15 <- roads[which(roads$FULLNAME == "I- 15"), ] %>%
  sf::st_cast(.,"MULTILINESTRING")
```

```
# plot of i-15 in Utah (Interstate only)
road_plot <- ggplot()+
  geom_sf(data = roads_i15,
          color = 'blue',
          aes(geometry = geometry))
road_plot
```



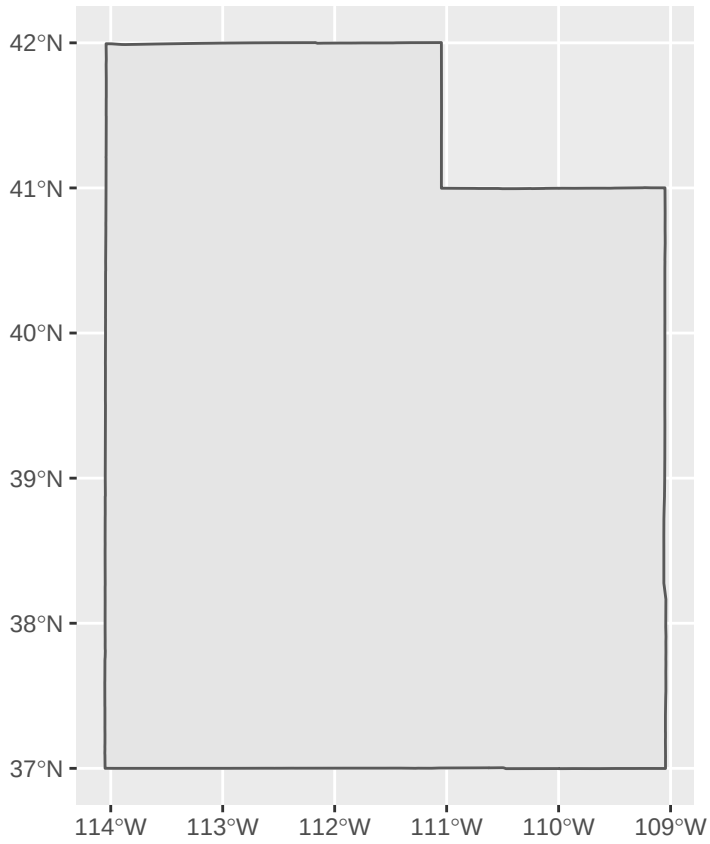
Utah

```
# sf of USA
us_geo <- tigris::states(class = "sf", cb = TRUE) %>%
  shift_geometry()
```

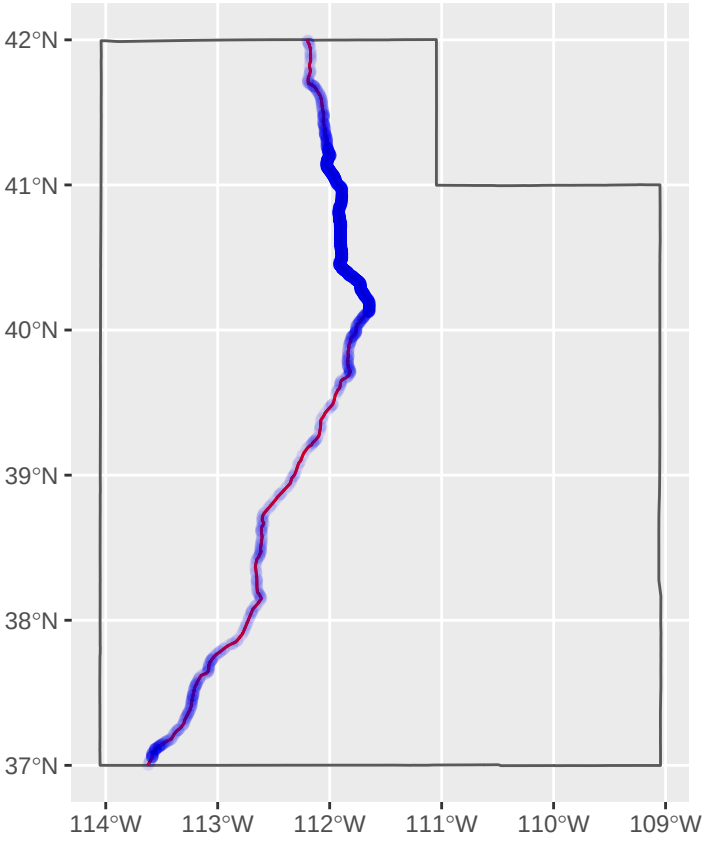
```
##   |                                                                              |
```

```
# Subsetting to Utah and changing crs to match roads in Utah
ut_map <- us_geo[which(us_geo$NAME == "Utah"), ] %>%
  st_transform(. ,crs = st_crs(roads_i15))
```

```
# plot of Utah
ut_plot <- ggplot(ut_map) +
  geom_sf()
ut_plot
```




```
# plot of Utah, I-15, and Car Accidents
all_plot <- ggplot(ut_map)+
  geom_sf(fill = NA)+
  geom_sf(data = roads_i15,
          color = 'red') +
  geom_sf(data = i15_spat,
          color = 'blue',
          alpha = 0.025)
all_plot
```


42°N
41°N
40°N
39°N
38°N
37°N
114°W
113°W
112°W
111°W
110°W
109°W