Utah Car Accidents Data and Code

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Load Libraries and Data file

```r
# For Data Cleaning and Visualization
library("dplyr")
```

```
## Warning: package 'dplyr' was built under R version 4.1.1
```

```
##
## 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
```

```r
library("tigris")
```

```
## Warning: package 'tigris' was built under R version 4.1.1
```

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

```r
library("ggplot2")
```

```
## Warning: package 'ggplot2' was built under R version 4.1.1
```

```r
library("sf")
```

```
## Warning: package 'sf' was built under R version 4.1.1
```

```
## Linking to GEOS 3.9.1, GDAL 3.2.3, PROJ 7.2.1; sf_use_s2() is TRUE
```

```r
crash <- read.csv("../data-raw/RawCrashData2020.csv")
stations <- read.csv("../data-raw/i_15_Flow_Data_2020.csv")
```
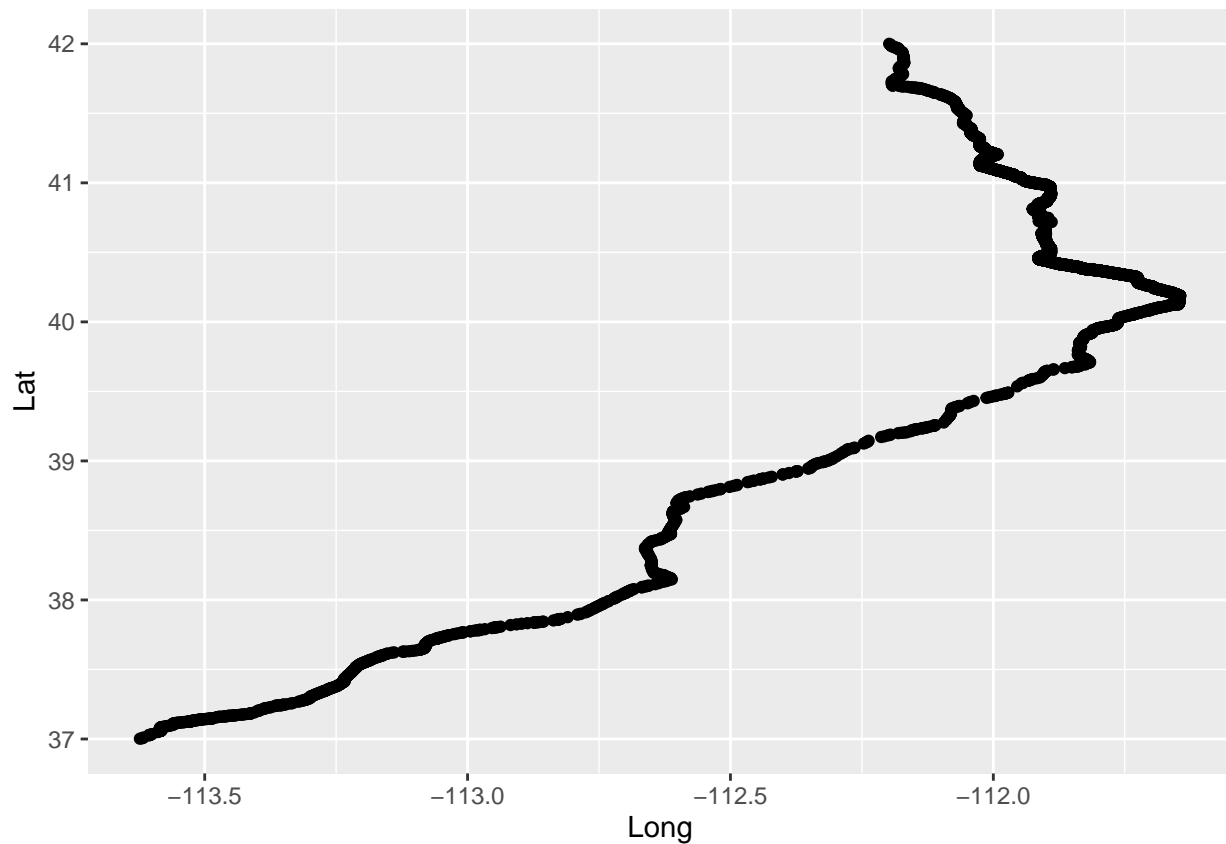
Data Prepping

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 %>%
```
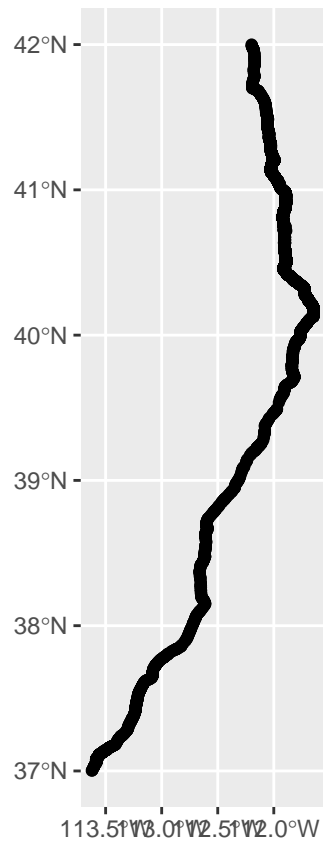
```
  dplyr::filter(Route == "0015") %>%
  dplyr::select(.,Lat, Long)
```

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



```
# 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
```
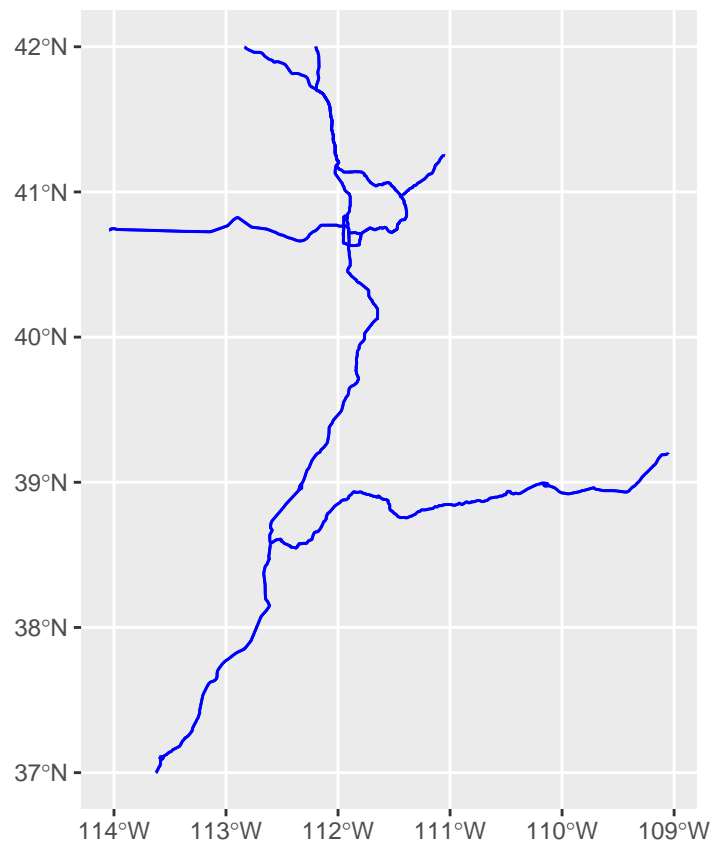
Roads

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

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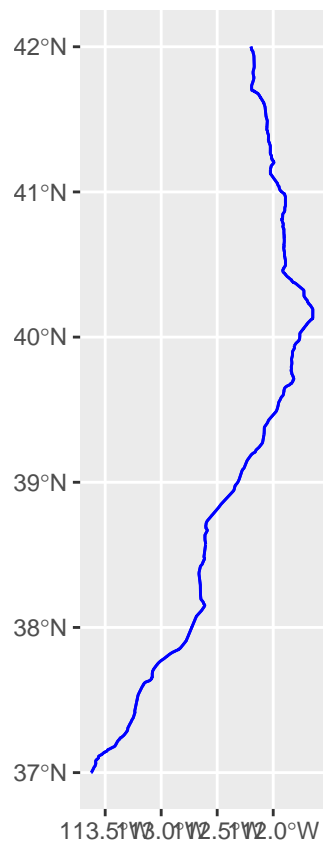
```
##   |                                                                          |
```

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

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

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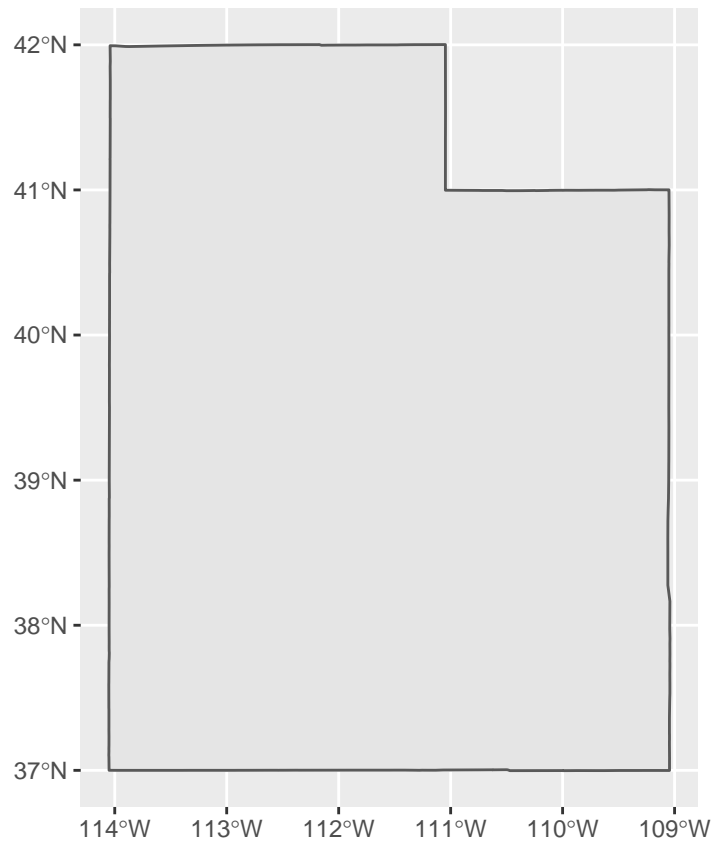
Utah

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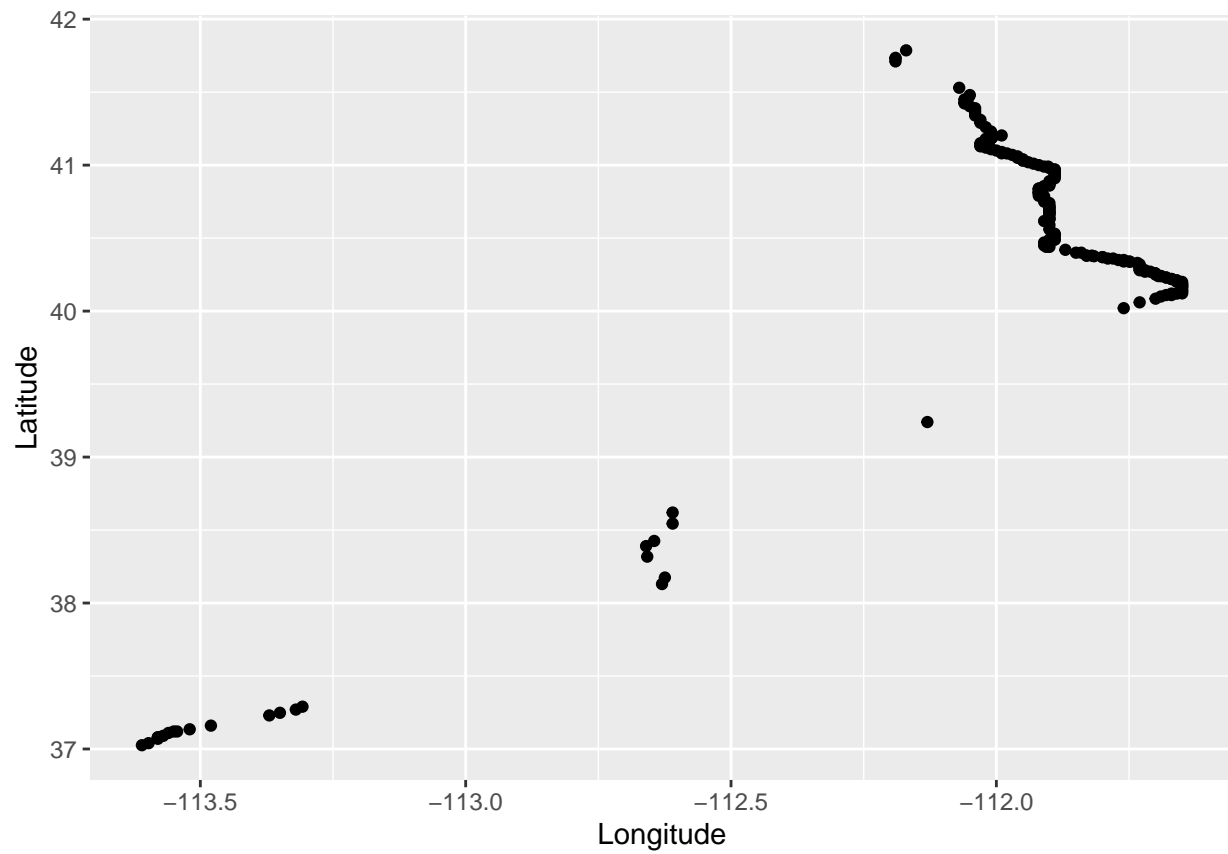
```
##   |                                                                      |
```

```r
# 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))
```

```r
# plot of Utah
ut_plot <- ggplot(ut_map) +
  geom_sf()
ut_plot
```
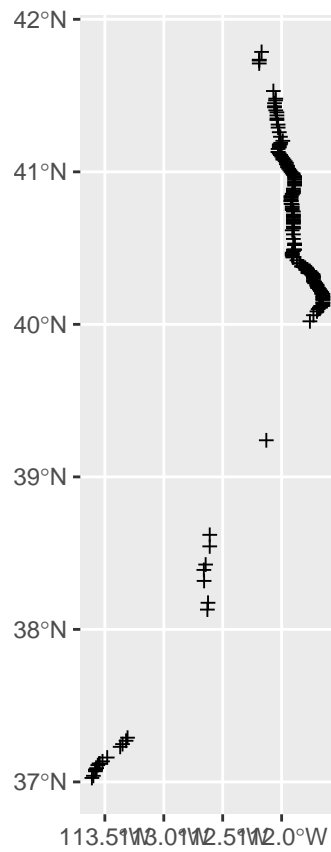
```
# plot of Stations
ggplot() +
  geom_point(
    data = stations,
    aes(x = Longitude, y = Latitude)
  )
```

```r
# Sf with NAD83 matches CRS of Utah map and Roads
stat_spat <- sf::st_as_sf(
  x = stations,
  coords = c("Longitude", "Latitude"),
  crs = 4269
)
```

```r
# Plot of spatial object crashes
station_plot <- ggplot(stat_spat) +
  geom_sf(shape = 3)
station_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
  ) +
  geom_sf(
    data = stat_spat,
        shape = 3,
    color = "yellow",
    )
all_plot
```