03_1

ShaeChang

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```
# Load packages ------------------------------------------------------------

library(tidyverse)
library(sf)

# Load the data ------------------------------------------------------------

electricity_station_initial <-

  # read in the dataset

  st_read('data_own/alt_fuel_stations.geojson') %>%

  # convert an sf object into a pure tibble

  as_tibble()
```

```
## Reading layer `alt_fuel_stations' from data source
##   `/Users/maxzhang/GU/Data_viz/data_own/alt_fuel_stations.geojson'
##   using driver `GeoJSON'
## Simple feature collection with 58698 features and 66 fields
## Geometry type: POINT
## Dimension:     XY
## Bounding box:  xmin: -164.8489 ymin: 0 xmax: 77.64996 ymax: 64.85247
## Geodetic CRS:  WGS 84
```

```
electricity_station <-
  electricity_station_initial %>%

  # filter for the wanted types

  filter(

    # only include public electricity stations but not private ones

    access_code == 'public',

    # only include those are currently available but not planned nor
    # temporarily unavailable

    status_code == 'E',

    # only include those in the US

    country == 'US',

    # only include the charging stations open to the public

    restricted_access == FALSE) %>%

  # select the wanted traits of those electricity charging stations

  select(
    c(access_days_time, id, open_date, owner_type_code, state,
      ev_pricing, ev_renewable_source, facility_type))

# Data preperation ------------------------------------------------------

# create the wanted variable

elec_new <-
  electricity_station %>%

  # create a variable measuring this station charge individuals or not

  mutate(Charge =
           if_else(
             str_detect(ev_pricing, 'Free'),
             'Free',
             'Not free')) %>%

  # filter the missing values for the two variables we care

  filter(
    !is.na(Charge),
    !is.na(owner_type_code)) %>%

  # generate new categorical names
```

```
  mutate(owner_type_new =
           case_when(
             owner_type_code == 'FG' ~ 'Federal',
             owner_type_code == 'J' ~ 'Jointly',
             owner_type_code == 'LG' ~ 'Local/Municipal',
             owner_type_code == 'P' ~ 'Privately',
             owner_type_code == 'SG' ~ 'State/Provincial',
             owner_type_code == 'T' ~ 'Utility'))

  # convert the owner type into a factor with specific levels

elec_new$owner_type_new <-
  factor(elec_new$owner_type_new,
         levels = c('Federal',
                    'State/Provincial',
                    'Local/Municipal',
                    'Jointly',
                    'Utility',
                    'Privately'))

# Data visualization --------------------------------------------------------

p1 <-
  elec_new %>%
  ggplot(mapping =
           aes(x = owner_type_new)) +
  geom_bar(aes(fill = Charge),
           position = 'dodge') +
  scale_x_discrete(drop = FALSE) +

  # to use green to represent free while use a diverging color of orange to
  # represent not free

  scale_fill_manual(values = c('#99d594',
                               '#fc8d59')) +
  labs(title = 'Ownership and charging of electric vehicle charging posts',
       subtitle = paste('Charges for electric vehicle charging stations of',
                'different owners in US'),
       caption = 'Data: afdc.energy.gov',
       x = 'Ownership of EV charging posts',
       y = 'Count (numbers)') +
  theme(
    axis.ticks = element_blank(),
    panel.background = element_blank())
```