PPOL 646 - 01 Interim Visualization Assignment 3

Xiyu. Zhang

TOTAL POINTS

3.67 / 0

QUESTION 1

1 Visualization 1 **0 / 0**

+ 0 pts A really nice original visualization in R!

+ 0 pts Choice of plot type (bar chart, line chart, etc.) should be appropriate to the type of data.

✓ **+ 0 pts** *Is there a particular substantive insight or finding that you want readers to take away from this visualization? If so, consider adjusting the title and/or adding annotation that helps readers to discover it more quickly. If not, consider posing a question or two that invites the reader to look for potential findings that might not be immediately obvious.*

+ 0 pts Graph should clearly indicate the unit of analysis (U.S. adults?, states? counties? countries?) and each variable's unit of measurement. And perhaps more information about the key measure(s). For example, are the data annual or monthly? A percentage? Per capita? Pounds? Kilograms? US dollars (nominal or constant)?

+ 0 pts Graph should include a title that indicates the content of the visualization.

✓ **+ 0 pts** *Titles, subtitles, and annotation should have proper capitalization, spelling, punctuation, and, as appropriate, grammar.* ==If your title/subtitle is effectively a declarative sentence, capitalize it the way you would capitalize a sentence.== *The title does*

not, however, require a period at the end. The first occurrence of an acronym should usually be spelled out, unless the acronym is **very** familiar to the broader audience, e.g., "US" for "United States."

+ 0 pts Axes and tic marks (if applicable) should be appropriately labeled and have an appropriate range. Axis and tic mark labels should have proper capitalization, spelling, punctuation, and, as appropriate, grammar. Generally, capitalize only the first word of an axis label unless it includes a proper noun. When possible, axis labels should be horizontal. Exclude unnecessary axis names, such as "Year" if the meaning is already clear enough for readers to understand

✓ **+ 0 pts** *Graph should credit the source of the data. Acronyms in the credit should usually be spelled out, unless they are very familiar to the broader audience, e.g., "US" for "United States."* ==The data source credit should be an institution (such as "World Bank" or "US Bureau of the Census" and possibly even the name of a study or a data set produced by that institution. A URL can be unstable.==

+ 0 pts Graphs that use more than one value of a mark channel (such as hues, textures, color values, or shapes) should explain the meaning of each value by using labels, a legend, or some other key. A legend should be easy to understand and use correct spelling, capitalization, and

punctuation. For some graphs (such as line graphs), consider directly labeling the elements (such as the lines) instead of using a legend.

+ 0 pts The strongest visualizations will reflect conscious design choices and more exercise of control instead of relying on the software defaults, such as default color choices and the grey background. Graphs should be in color. Lines that encode data should often be thicker than the default from R or ggplot.

+ 0 pts Type sizes of similar graph elements (e.g., value labels, legend labels) should be the same.

+ 0 pts Graph title or subtitle annotation should more prominently note the represented population (e.g., USA, China, world, Texas) somewhere. Specify "U.S. States" instead of only "States".

✓ **+ 0 pts** *Graph title or subtitle annotation should more prominently indicate the time period represented.*

✓ **+ 0 pts** *Consider* ==using a sans sarif type face== *for a more contemporary, professional-looking presentation.*

+ 0 pts Data selected for use should match the substantive claim(s) in the annotation.

+ 0 pts Stronger graphs will exclude unnecessary design elements, e.g., duplicate information or axis lines, such as a top axis line that has neither tic marks nor tic labels.

+ 0 pts Use ggplot instead of base R graphics for this visualization.

+ 0 pts A very good application of the code that we learned in class. The strongest work will

demonstrate extending the work with more of your own code.

+ 0 pts Strengthen the visual hierarchy of the text elements by ensuring that, for example, labels do not compete with the graph title for the reader's attention.

✓ **+ 0 pts** *The strongest visualizations will provide the reader with* ==insights beyond those obtainable from looking at a table of the numbers used to create the visualization==.

+ 0 pts Could improve aesthetics and/or general readability.

+ 0 pts Visual encoding choices (e.g., using hues to represent values of a categorical variable, or position, length, area to represent quantitative variables) could be strengthened.

+ 0 pts Could improve visual hierarchy to feature the encoded data more prominently than accessory elements, such as labels, reference lines/rectangles, legends, etc.

+ 0 pts Keep Mackinlay's "expressiveness principle" in mind. The most important variable(s), given your substance claim, should be represented by the marks/channels that readers can most quickly and accurately decode/interpret.

💬 Nice job! The color and font choices you made are very nice. The source of your data should not be a URL as those are unstable, and I would make sure in either the axis label or title/subtitle that "EV" is clearly "Electric vehicle." The phrasing of "free" and "not free" is a little confusing at first glance - maybe "free" and "paid"? Similarly, I would

say "Count of EV owners" on the y axis - we know that counts are in units of numbers, so that information isn't necessary. Finally, I would consider adding a substantive takeaway via a subtitle or annotation - is there a particular feature of the data you want to highlight?

2 Visualization 2 **3.67 / 0**

+ 0 pts A really nice original visualization in R!

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conscious design choices and more exercise of control instead of relying on the software defaults, such as default color choices and the grey background. Graphs should be in color. Lines that encode data should often be thicker than the default from R or ggplot.

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+ 3.67 *Point adjustment*

  💬 Nice job. This is very nice work. The code for the second visualization (not the wrangling, but the graph) is nearly identical to the code for the first visualization. The strongest work will demonstrate a broader variety of capabilities.

  Similar to the other plot, you should not use a URL for your data source as those are unstable, you should make sure that the EV acronym is spelled out for both the title and axis label, and the Y axis should be more

explicit in what you are counting ("Count of Charging Piles", for example). I would also consider adding a takeaway for your reader as a subtitle or annotation that highlights some feature of your data/chart.
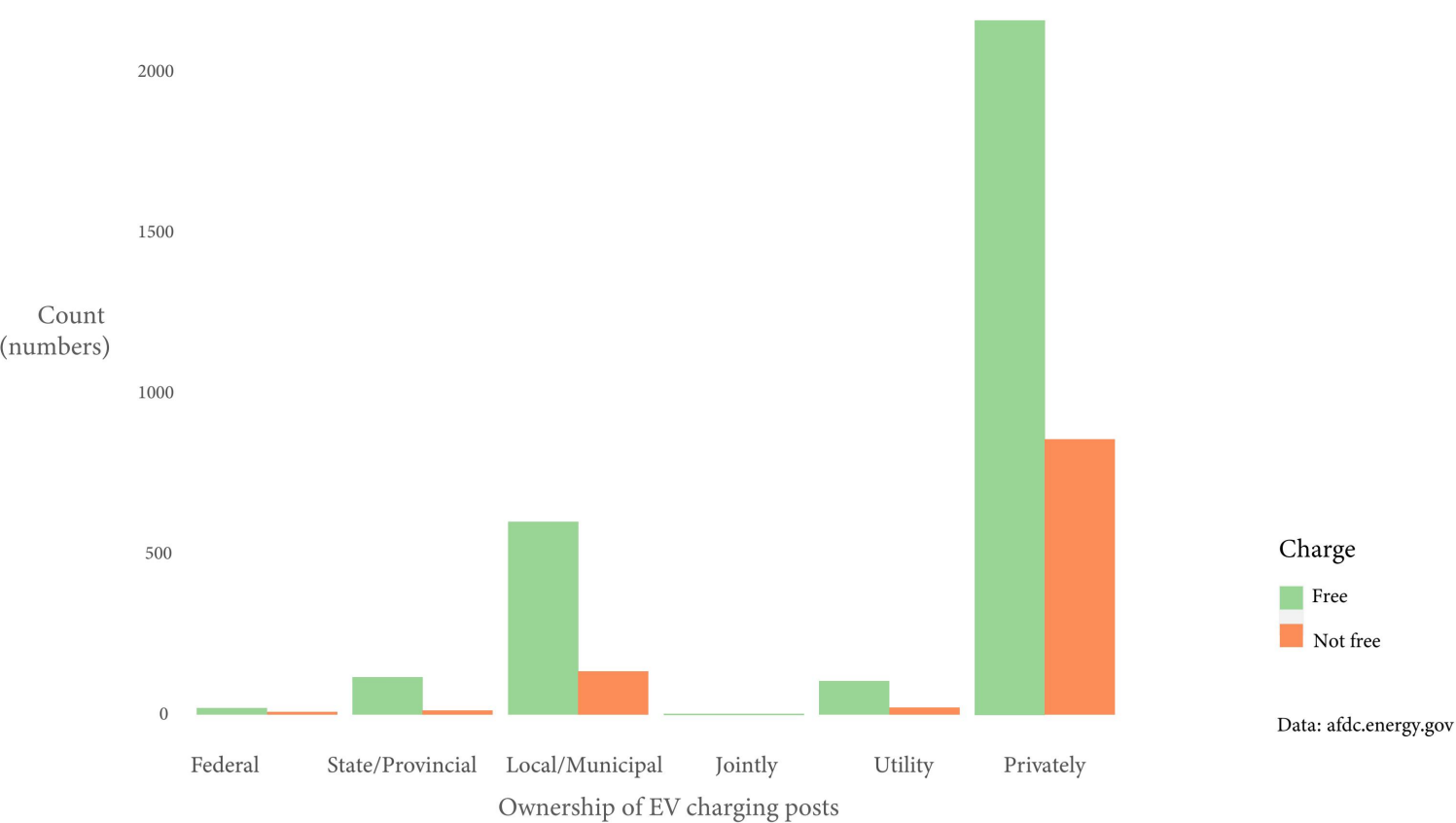
1 In the subtitle annotation, please describe a more explicit connection between these two items.

gradescope

This bar chart still serves the theme of my thesis. The reason I created this bar chart is that I wanted to see how many of the charging posts built by different owners that are open to the public are free and how many of them are paid. I used a light green color for free and a light orange color to show a mild contrast with it for charging.

Ultimately, what this graph tells us is that, first, free charging is the majority of charging posts owned by various entities. Secondly, private charging posts are the type with the most ownership of charging posts.

Ownership and charging of electric vehicle charging posts

Charges for electric vehicle charging stations of different owners in US

Count
(numbers)

2000

1500

1000

500

0

Federal · State/Provincial · Local/Municipal · Jointly · Utility · Privately

Ownership of EV charging posts

Charge
- Free
- Not free

Data: afdc.energy.gov

03_1

ShaeChang

2023-03-16

```r
# 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
```

```r
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
```

```r
  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())
```

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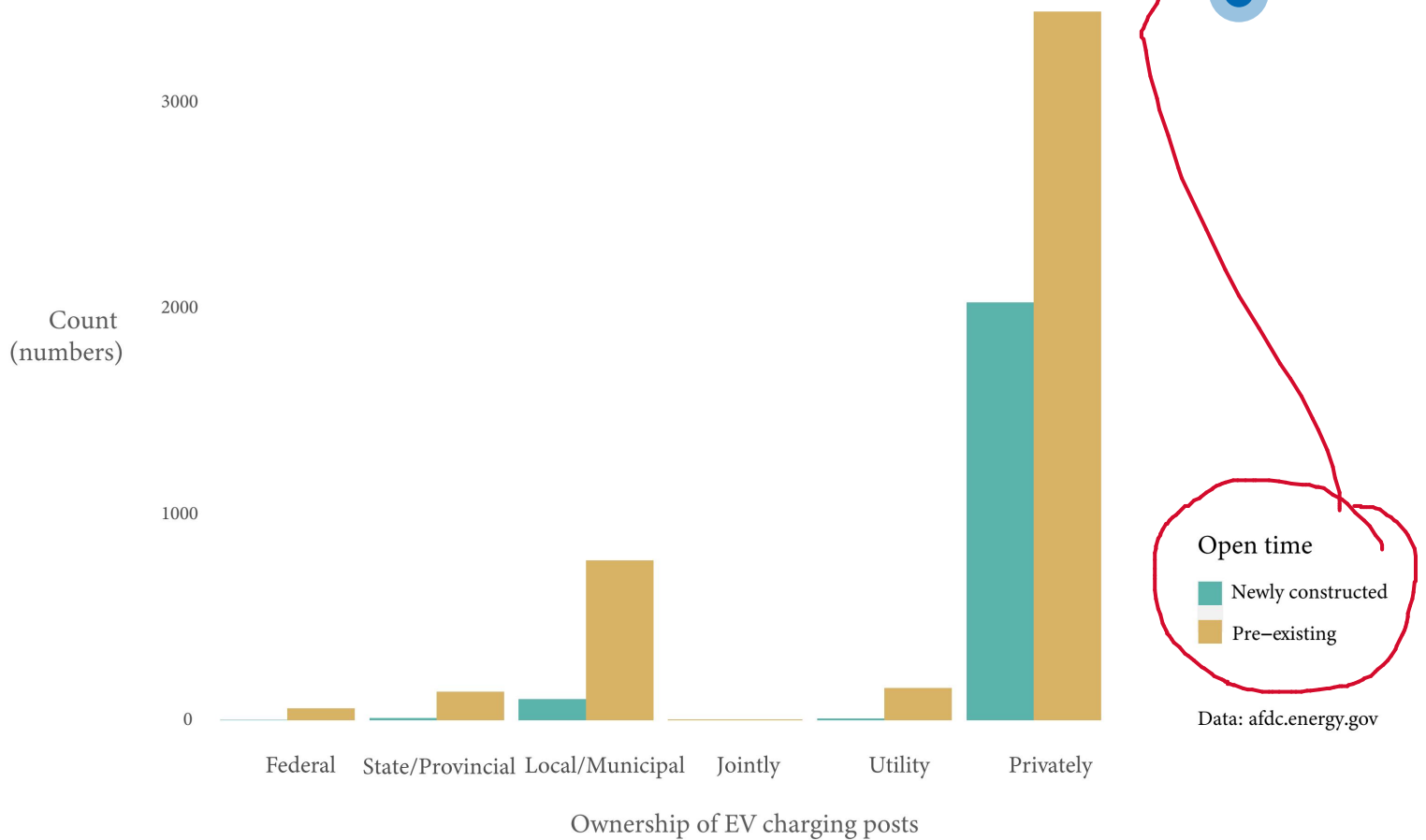
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ıll gradescope

This data visualization, like the previous one, serves the topic of the thesis. Its purpose is to show which entity will have the greatest incentive to build electric vehicle charging posts as a result of the Bipartisan Infrastructure Law Incentives issued by the Biden administration in November 2021. Based on the graphs made, it appears that this bill has incentives for Local/Municipal and Private for the construction of charging posts and that the incentives are mainly focused on private entities. This makes sense because under the new bill, private entities can receive tax credits for building EV charging stations. But on the other hand, the Bipartisan Infrastructure Act also allocates significant funds to all levels of government to facilitate the construction of EV charging infrastructure, and the flow and role of these funds should be further examined.

Bipartisan Infrastructure Law Incentives for building EV charging posts

Comparison of the number of charging piles built by different entities before and after November 16, 2021

Open time
- Newly constructed
- Pre-existing

Data: afdc.energy.gov

Count (numbers)

3000

2000

1000

0

Federal · State/Provincial · Local/Municipal · Jointly · Utility · Privately

Ownership of EV charging posts

03-2

ShaeChang

2023-03-16

```r
# 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
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##   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
```

```r
electricity_station <-
  electricity_station_initial %>%

  # filter for the wanted types

  filter(

    # only include public electricity stations but not private ones

    access_code == 'public',

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    # 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 preparation --------------------------------------------------------

p2 <-
  elec_date <-
  electricity_station %>%
  filter(!is.na(open_date),
         !is.na(owner_type_code)) %>%
  mutate(open_time =
           if_else(open_date >= lubridate::ymd('2021-11-16'),
                   'Newly constructed',
                   'Pre-existing')) %>%
  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'))

elec_date$owner_type_new <-
  factor(elec_date$owner_type_new,
```

```r
                levels = c('Federal',
                           'State/Provincial',
                           'Local/Municipal',
                           'Jointly',
                           'Utility',
                           'Privately'))

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

p2 <-
  elec_date %>%
  ggplot(mapping =
           aes(x = owner_type_new)) +
  geom_bar(aes(fill = open_time),
           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('#5ab4ac',
                               '#d8b365')) +
  labs(title = paste('Bipartisan Infrastructure Law Incentives for building EV',
                     'charging posts'),
      subtitle = paste('Comparison of the number of charging piles built by',
                        'different entities before and after November 16, 2021'),
      caption = 'Data: afdc.energy.gov',
      x = 'Ownership of EV charging posts',
      y = 'Count (numbers)') +
  theme(
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2 Visualization 2 **3.67 / 0**

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Similar to the other plot, you should not use a URL for your data source as those are unstable, you should make sure that the EV acronym is spelled out for both the title and axis label, and the Y axis should be more explicit in what you are counting ("Count of Charging Piles", for example). I would also consider adding a takeaway for your reader as a subtitle or annotation that highlights some feature of your data/chart.

1

In the subtitle annotation, please describe a more explicit connection between these two items.