Towards Interactivity

HES 505 Fall 2023: Session 31

Matt Williamson

Objectives

3 Categories of data visualization

- Static
- Interactive
- Dynamic

dynamic

Why Move Beyond Static Maps?

Dealing with complex datasets

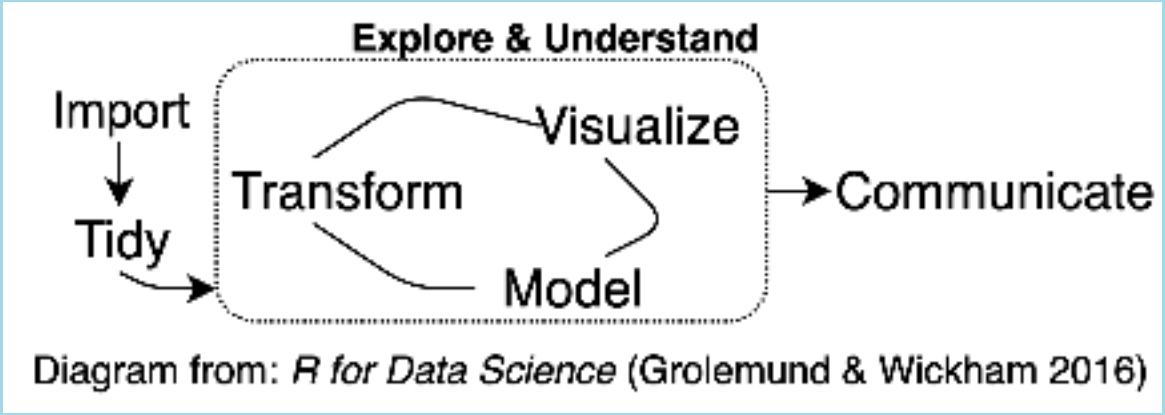


Diagram from: *R for Data Science* (Grolemund & Wickham 2016)

- Identifying structure that might otherwise be hidden
- Diagnosing models and interpreting results
- Aiding the sense-making process

Clarity in presentation

- Zooming allows the user to determine scale of presentation
- Hovering allows more information to be displayed ‘on-demand’
- Subsetting facilitates ease of interpretation

Designing for the User

Who is your audience?

- Your advisor and colleagues?
- An external collaborator?
- The general public?
  - User archetypes

Iteration

From Usability.gov

- Feedback is critical
- Ideation: What *specifically* does the user need?
- Meaning: Are the data clearly defined and explained? Are the conclusions obvious?
- Function: Given the usecases, will the application (visualization) actually perform?

Building interactive visualizations in R

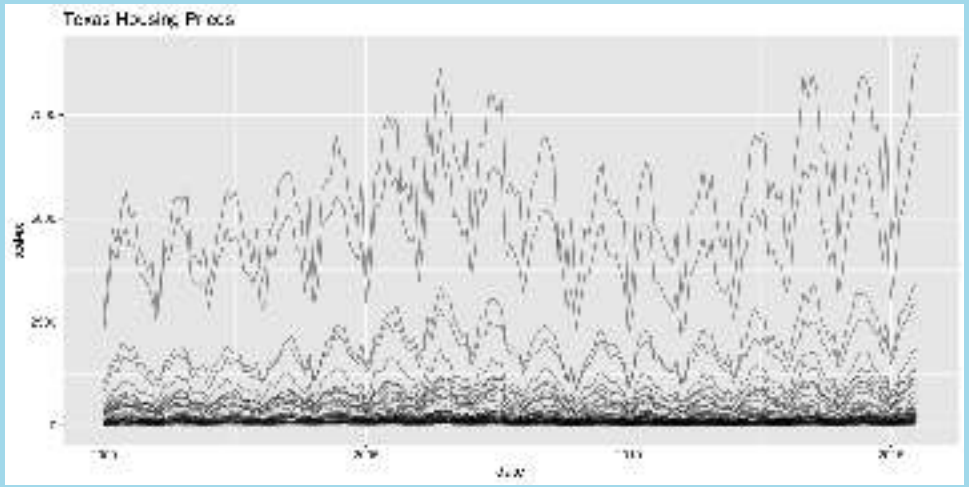
A note about APIs

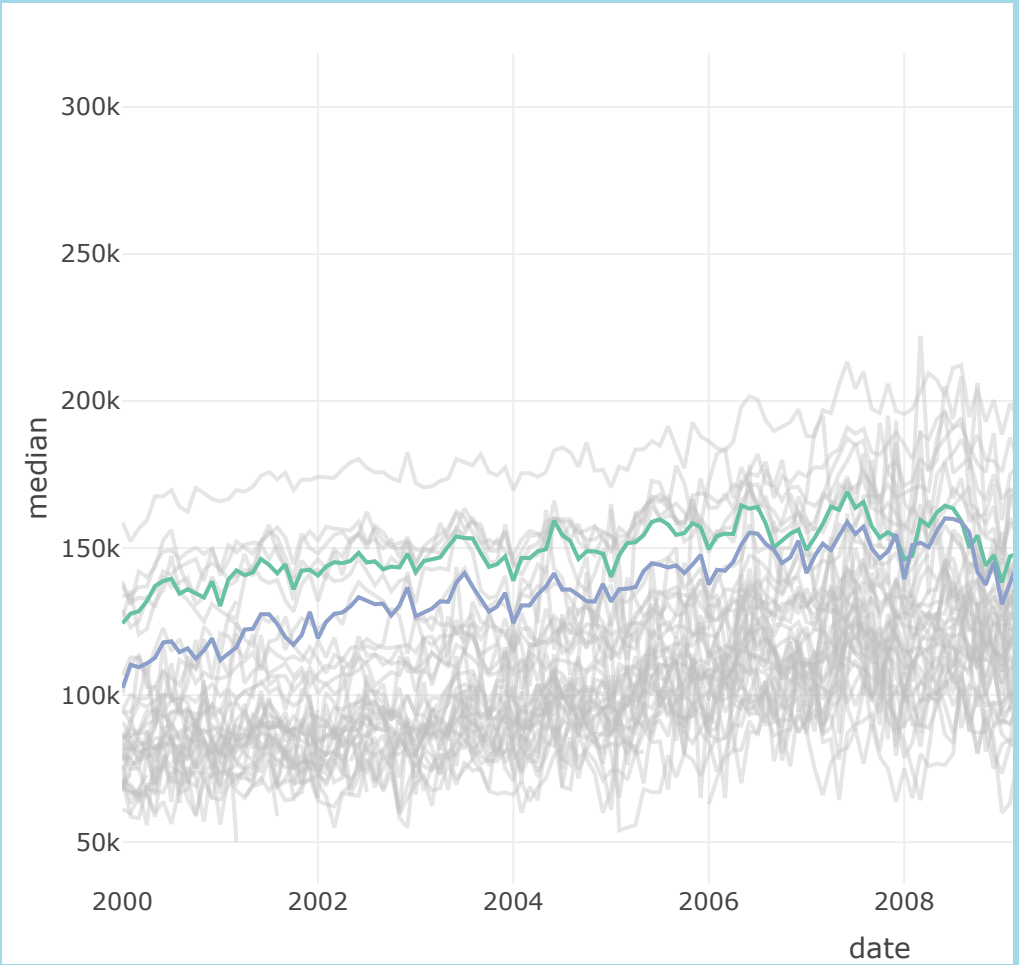
- API: Application Programming Interface
- A software intermediary that allows two applications to "communicate"
- Lots of R packages rely on APIs to access data on the web (e.g.,`tidycensus`)
- Facilitates reproducibility and powerful web applications built on R analyses
- May require "keys" and additional parsing (Mapbox and Google)

Interactive maps with `mapview` and `tmap`

- Easy extension of your existing
- Class Demo

Clarity in presentation (revisited)





Using `plotly`

- Syntax is similar to `ggplot`
- `hoverinfo` describes which elements you'd like to make interactive
- Other plot elements available (see `?plot_ly`)

Using plotly

```
g <- txhousing %>%
  # group by city
  group_by(city) %>%
  # initiate a plotly object with date on x and median on y
   plotly::plot_ly(x = ~date, y = ~median) %>%
  # add a line plot for all texan cities
   plotly::add_lines(name = "Texan Cities", hoverinfo = "none",
             type = "scatter", mode = "lines",
             line = list(color = 'rgba(192,192,192,0.4)')) %>%
  # plot separate lines for Dallas and Houston
   plotly::add_lines(name = ~city,
             data = filter(txhousing,
                           city %in% c("Dallas", "Houston")),
             hoverinfo = ~city,
             line = list(color = c("red", "blue")),
             color = ~city)
```

Animated maps with tmap and gganimate

::: columns ::: {.column width="40%"}

```
urb_anim = tm_shape(world) + tm_polygons() +
  tm_shape(urban_agglomerations) + tm_dots(size = "population_millions") +
  tm_facets(along = "year", free.coords = FALSE)
tmap_animation(urb_anim, filename = "urb_anim.gif", delay = 25)
```

::: ::: {.column width="60%"}