Introduction

A bit of a depot for things-/methods- mapping with R & `ggplot`, in the context of visualizing historical roll calls from the US House of Representatives. Roll call data accessed via VoteView and the RVoteview package; shapefiles for historical US Congressional Districts downloaded from the Political Science Dept @ UCLA. Visual summary via the `patchwork` package.

Here we use as examples the **Voting Rights Act of 1965** and the **Bayh–Celler amendment** (circa 1969), a proposed amendment that would have replaced the Electoral College with a system based on the popular vote.

```
#  devtools::install_github("voteview/Rvoteview")
library(patchwork)
library(tidyverse)
library(tigris); options(tigris_use_cache = TRUE, tigris_class = "sf")
nonx <- c('78', '69', '66', '72', '60', '15', '02')

states <- tigris::states(cb = TRUE) %>%
  data.frame() %>%
  select(STATEFP, STUSPS) %>%
  rename(state_abbrev = STUSPS)
```

Historical urban centers

Most populous US cities by decade, from 1790 to 2010; scraped from Wikipedia. For zooming-in on district roll call results for, eg, the ten most populous cities during a given congress.

```
wiki <- 'https://en.wikipedia.org/wiki/List_of_most_populous_cities_in_the_United_States_by_decade'

decade <- seq(from = 1780, to = 2010, by = 10)
pops_list <- xml2::read_html(wiki) %>%
  rvest::html_nodes("table") %>%
  rvest::html_table(fill = TRUE)

pops <- lapply(2:24, function(x) {
  y <- pops_list[[x]] %>%
    select(1:4) %>%
    mutate(decade = decade[x])

  colnames(y) <- c('rank', 'city', 'state', 'pop', 'decade')
  return(y) }) %>%
  bind_rows() %>%
  mutate(pop = as.integer(gsub("[^0-9]", "", pop)))
```

Most populated US cities circa 1800:

rank	city	state	pop	decade
1	New York	New York	60514	1800
2	Philadelphia	Pennsylvania	41220	1800

rank	city	state	pop	decade
3	Baltimore	Maryland	26514	1800
4	Boston	Massachusetts	24937	1800
5	Charleston	South Carolina	18824	1800
6	Northern Liberties	Pennsylvania	10718	1800
7	Southwark	Pennsylvania	9621	1800
8	Salem	Massachusetts	9457	1800
9	Providence	Rhode Island	7614	1800
10	Norfolk	Virginia	6926	1800

Historical congressional districts

Again, via the folks at the Political Science Dept @ UCLA. The Voting Rights Act of 1965 was passed during the 89th congress; a local copy of the shapefile for this congress is loaded below.

```
fname <- 'districts089'

cd_sf <- sf::st_read(dsn = paste0(cd_directory, fname),
                     layer = fname,
                     quiet = TRUE) %>%
  mutate(STATEFP = substr(ID, 2, 3),
         district_code = as.numeric(substr(ID, 11, 12))) %>%
  left_join(states, by = "STATEFP") %>%
  filter(!STATEFP %in% nonx) %>%
  select(STATEFP, state_abbrev, district_code)
```

VoteView roll call data

Downloading roll call data for a specific bill via `RVoteview` requires a bit of trial and error; different bill versions and vote types complicate things for the layman.

```
vra <- Rvoteview::voteview_search('("VOTING RIGHTS ACT OF 1965") AND
(congress:89)
                                  AND (chamber:house)') %>%
                                  filter( date == '1965-07-09') %>%
  janitor::clean_names()

votes <- Rvoteview::voteview_download(vra$id)
names(votes) <- gsub('\\.', '_', names(votes))
```

A quick re-structure of the roll call output:

```
big_votes <- votes$legis_long_dynamic %>%
  left_join(votes$votes_long, by = c("id", "icpsr")) %>%
  filter(!grepl('POTUS', cqlabel)) %>%
  group_by(state_abbrev) %>%
  mutate(n = length(district_code)) %>%
  ungroup() %>%
  mutate(avote = case_when(vote %in% c(1:3) ~ 'Yea',
                           vote %in% c(4:6) ~ 'Nay',
                           vote %in% c(7:9) ~ 'Not Voting'),
```

```
         party_code = case_when(party_code == 100 ~ 'Dem',
                                party_code == 200 ~ 'Rep' ),
         Party_Member_Vote = paste0(party_code, ': ', avote),

         ## fix at-large --
         district_code = ifelse(district_code %in% c(98, 99), 0,
district_code),
         district_code = ifelse(n == 1 & district_code == 1, 0,
district_code),
         district_code = as.integer(district_code)) %>%
  select(-n)
#Members who represent historical "at-large" districts are
##assigned 99, 98, or 1 in various circumstances. Per VoteView.
```

Roll call stats

```
big_votes$Party_Member_Vote <- factor(big_votes$Party_Member_Vote)
big_votes$Party_Member_Vote <-
  factor(big_votes$Party_Member_Vote,
         levels(big_votes$Party_Member_Vote)[c(3,6,1,4,2,5)])
```

/Results

```
summary <- big_votes %>%
  group_by(party_code, avote) %>%
  count() %>%
  spread(avote, n) %>%
  janitor::adorn_totals(where = c('row', 'col')) %>%
  rename(Party = party_code,
         NV = `Not Voting`) %>%
  select(Party, Yea, Nay, NV, Total)
```

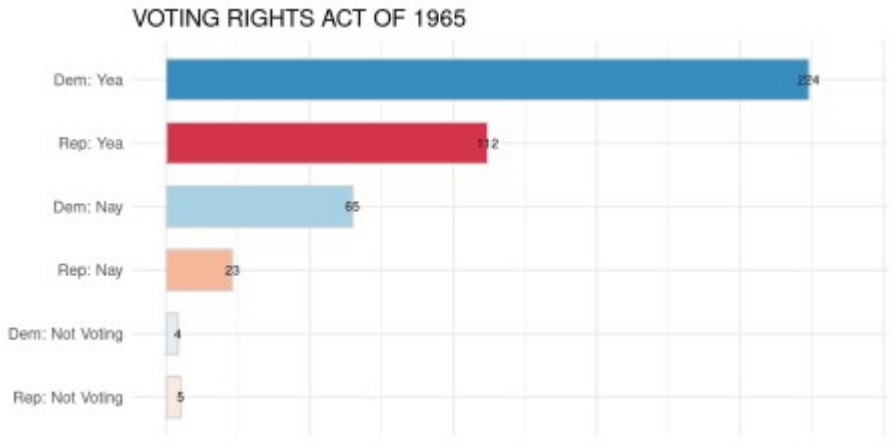
Table 1: Roll call results for the VRA

Party	Yea	Nay	NV	Total
Dem	224	65	4	293
Rep	112	23	5	140
Total	336	88	9	433

/By party affiliation

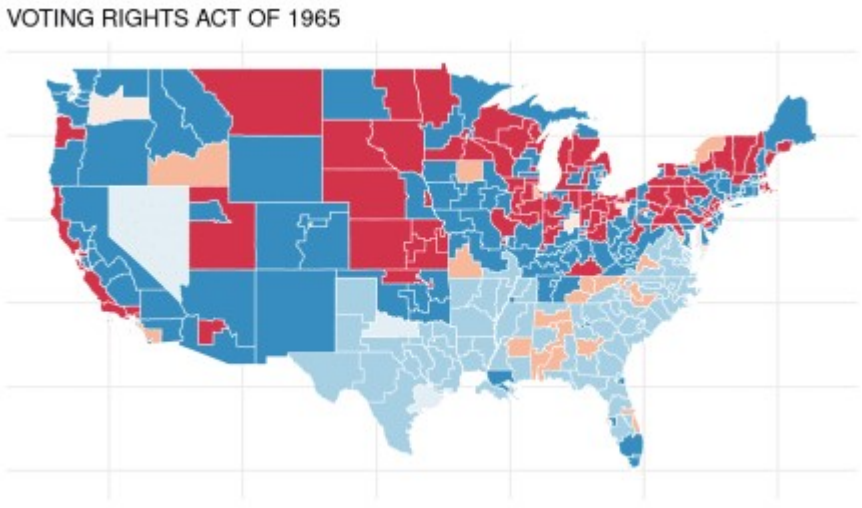
```
roll <- big_votes %>%
  group_by(Party_Member_Vote) %>%
  count() %>%
  ungroup() %>%
  rename(Vote = Party_Member_Vote)

rsum <- roll %>%
  ggplot(aes(x=Vote, y=n, fill= Vote, label = n)) +
    geom_col(width=.65, color = 'lightgray') +
    geom_text(size = 2.5) +
```

```
    wnomadds::scale_color_rollcall(aesthetics = c("fill")) +
    scale_x_discrete(limits = rev(levels(roll$Vote)))+
    coord_flip() +
  ylim (0, 240) +
    theme_minimal() +
      theme(axis.title.x=element_blank(),
            axis.text.x=element_blank(),
            axis.title.y=element_blank(),
            #axis.text.y=element_blank(),
            legend.position = 'none')

rsum + ggtitle(vra$short_description)
```



/By congressional district

```
cd_sf_w_rolls <- cd_sf %>%
  left_join(big_votes, by = c("state_abbrev", "district_code"))

main1 <- cd_sf_w_rolls %>%
  ggplot() +
  geom_sf(aes(fill = Party_Member_Vote),
          color = 'white',
          size = .25) +

  wnomadds::scale_fill_rollcall() +
  theme_minimal() +
  theme(axis.title.x=element_blank(),
        axis.text.x=element_blank(),
        axis.title.y=element_blank(),
        axis.text.y=element_blank(),
        legend.position = 'none') # +

main1 + ggtitle(vra$short_description)
```



Zooming in to urban centers

A zoom function for closer inspection of roll call results in urban areas. The `sub_geo` parameter is used to specify a vector of city/state pairs (eg, “Chicago, Illinois”) to be geocoded via the `tmaptools::geocode_OSM` function. The `geo` parameter specifies the full map – as `sf` object.

```
maps_get_minis <- function(sub_geos, geo){

  lapply(sub_geos, function(x) {

    lc <- tmaptools::geocode_OSM (q = x, as.sf = T)
    lc$bbox <- sf::st_set_crs(lc$bbox, sf::st_crs(geo))
    cropped <- sf::st_crop(geo, lc$bbox)

    ggplot() + geom_sf(data = cropped,
                       aes(fill = Party_Member_Vote),
                       color = 'white', size = .25) +

      # ggsflabel::geom_sf_text_repel(data = cropped,
      #                               aes(label = district_code),
      #                               size = 2.2) +

      wnomadds::scale_fill_rollcall() +
      theme_minimal() +
      theme(axis.title.x=element_blank(),
            axis.text.x=element_blank(),
            axis.title.y=element_blank(),
            axis.text.y=element_blank(),
            plot.title = element_text(size=9),
            legend.position = 'none') +
      ggtitle(gsub(',.*$', '', x))   })
}
```

/Coordinates

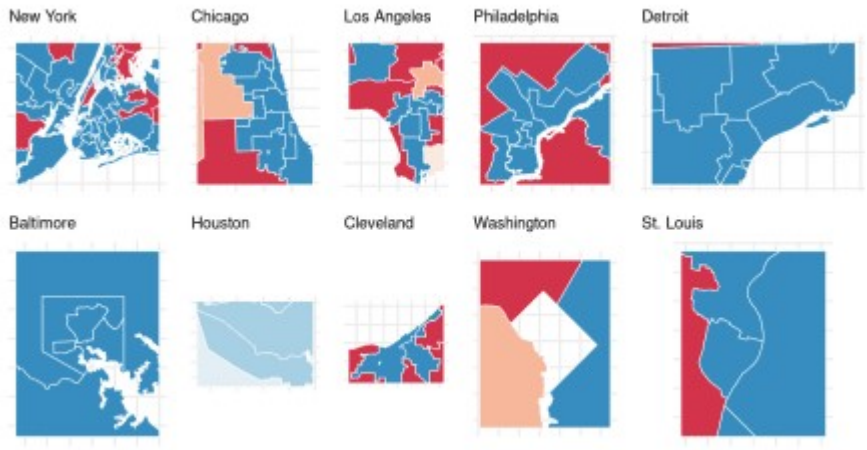
```
# x <- 'Albuquerque, New Mexico'
pops1 <- pops %>%
```

```
  filter(decade == paste0(gsub('.-.*$', '', vra$date), 0)) %>%
  arrange(desc(pop)) %>%
  mutate(locations = paste0(city, ', ', state)) %>%
  slice(1:10)

sub_maps <- maps_get_minis(geo = cd_sf_w_rolls, sub_geos =
pops1$locations)
```

/Zooms

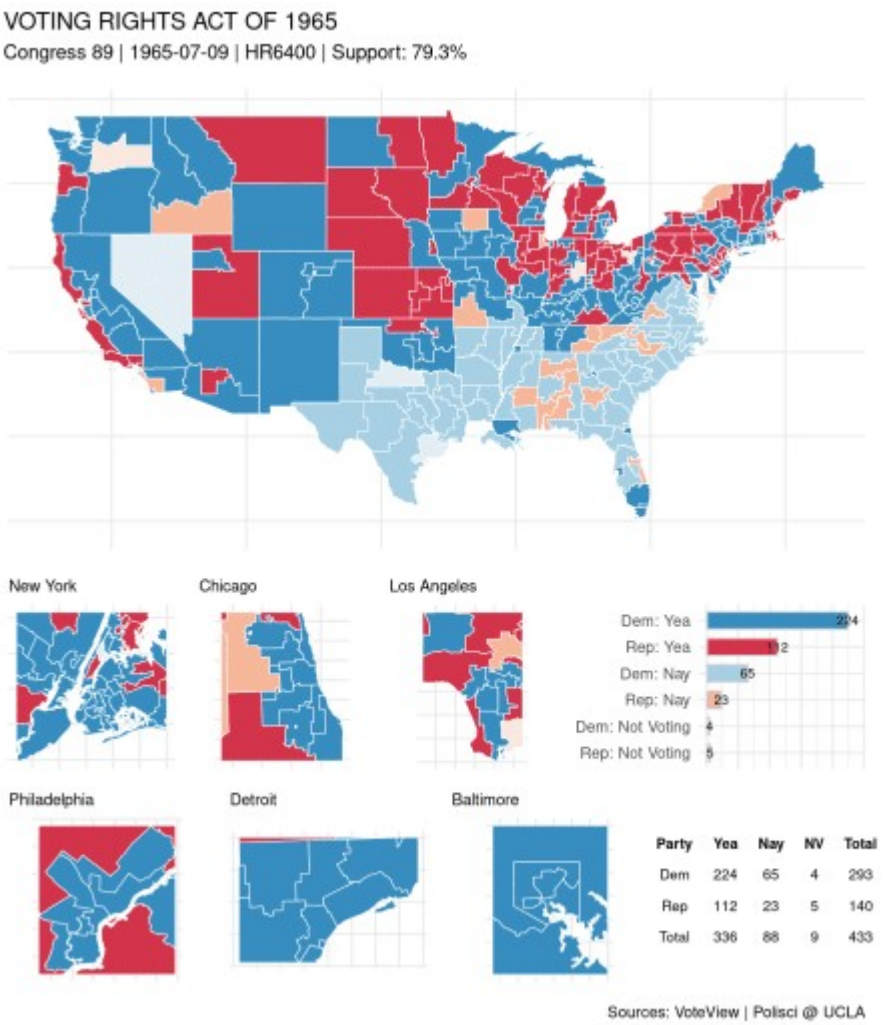
Roll call results for the VRA (1965) – zoomed in to the ten most populous US cities during the 1960s.

```
patchwork::wrap_plots(sub_maps, nrow = 2)
```



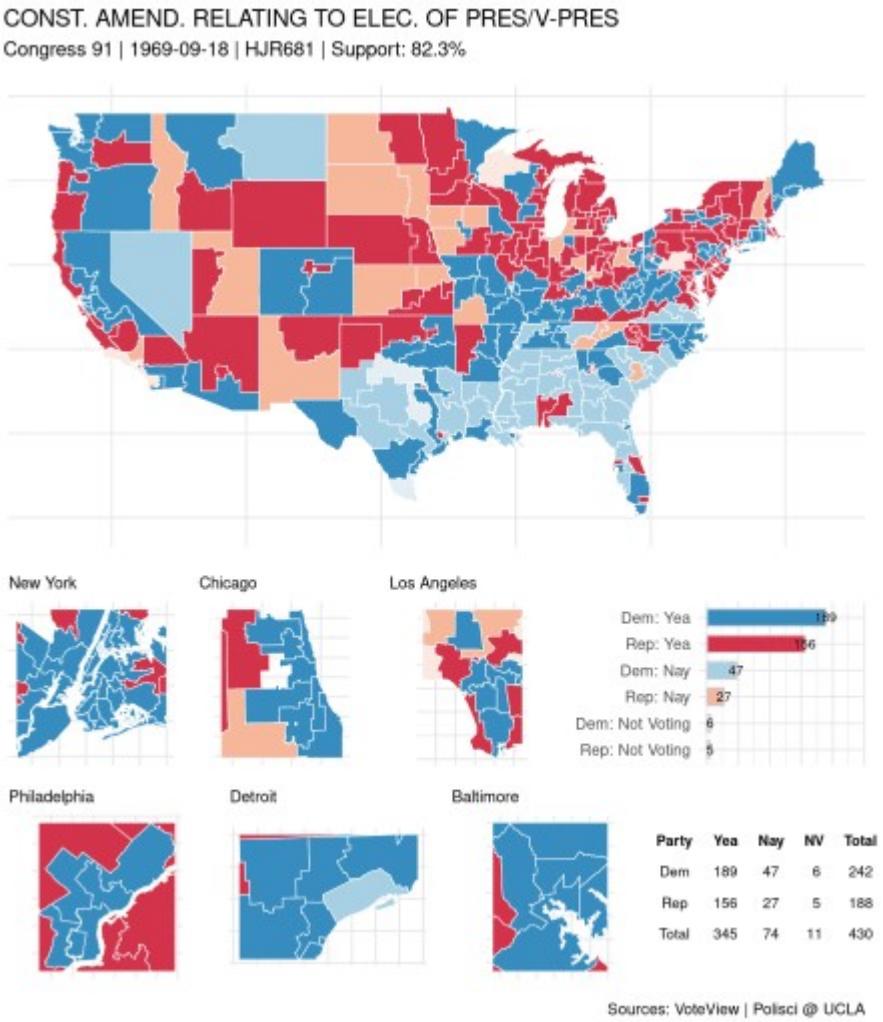
A `patchwork` perspective

```
t2 <- gridExtra::tableGrob(summary,
                           rows = NULL,
                           theme = gridExtra::ttheme_minimal(base_size
= 8))

p0 <- sub_maps[[1]] + sub_maps[[2]] + sub_maps[[3]] +
  rsum + patchwork::plot_layout(nrow = 1, widths = c(1,1,1,1))

p1 <- sub_maps[[4]] + sub_maps[[5]] + sub_maps[[6]] +
  t2 + patchwork::plot_layout(nrow = 1, widths = c(1,1,1,1))

p2 <- p0/p1 + patchwork::plot_layout(nrow = 2)#, heights = c(4, 1))
main1 / p2  + patchwork::plot_layout(ncol = 1, heights = c(5, 4)) +
  plot_annotation(
    title = vra$short_description,
    subtitle = paste0('Congress ', vra$congress, ' | ',
                      vra$date, ' | ', vra$bill_number, ' | ',
                      'Support: ', round(vra$support, 1), '%'),
     caption = 'Sources: VoteView | Polisci @ UCLA')
```



On the popular vote

Per code above, we can create a simple & reproducible work-flow for quickly exploring historical roll calls in the US Congress. For the **Bayh–Celler amendment** (circa 1969), then, we (down-) load the congressional district shapefile for the 91st congress from UCLA, and re-query `RVoteview`.



References

Lewis, Jeffrey B., Keith Poole, Howard Rosenthal, Adam Boche, Aaron Rudkin, and Luke Sonnet (2020). Voteview: Congressional Roll-Call Votes Database. https://voteview.com/