STAT 215A Fall 2020 Week 3

James Duncan

Announcements

Office Hours:

- Next week:
  - Bin: Tuesday 10-10:40, Thursday 1-2pm
  - James: Tuesday 1-3pm, Thursday 2-4pm
- After that:
  - Bin: Tuesday 1-2pm, Thursday 1-2pm
  - James: Monday 2-4pm, Thursday 2-4pm

Lab 1 Due: Thursday, Sept 17 at **11:59pm**

Lab 1: What to do if you’re stuck

Some thoughts if you’re stuck:

- Use your domain knowledge and curiosity to come up with questions you may want to answer
- Look at smaller parts of the data
    - Zoom in on a specific day or time of day

Lab 1: Clarifications

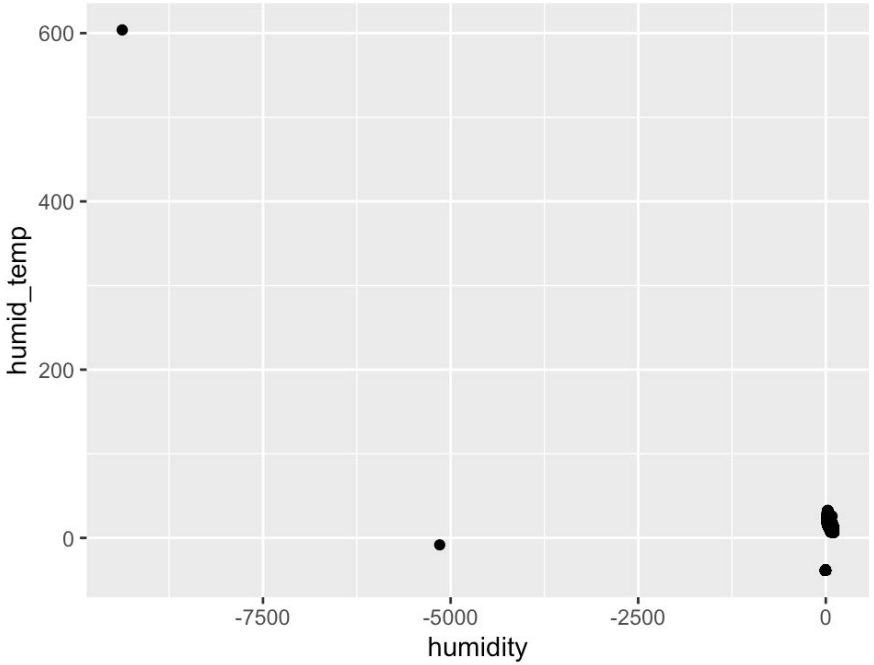
- If you wanted to do something but didn't have time, say so!
- Your .Rmd should generate the plot directly (i.e., put the plotting code in the .Rmd file)
- "Recall the three realms of data science: data / reality, algorithms / models, and **future data / reality**. Where do the different parts of this lab fit into those three realms?"
    - OK if you want to argue not all three realms are covered, but explain why.

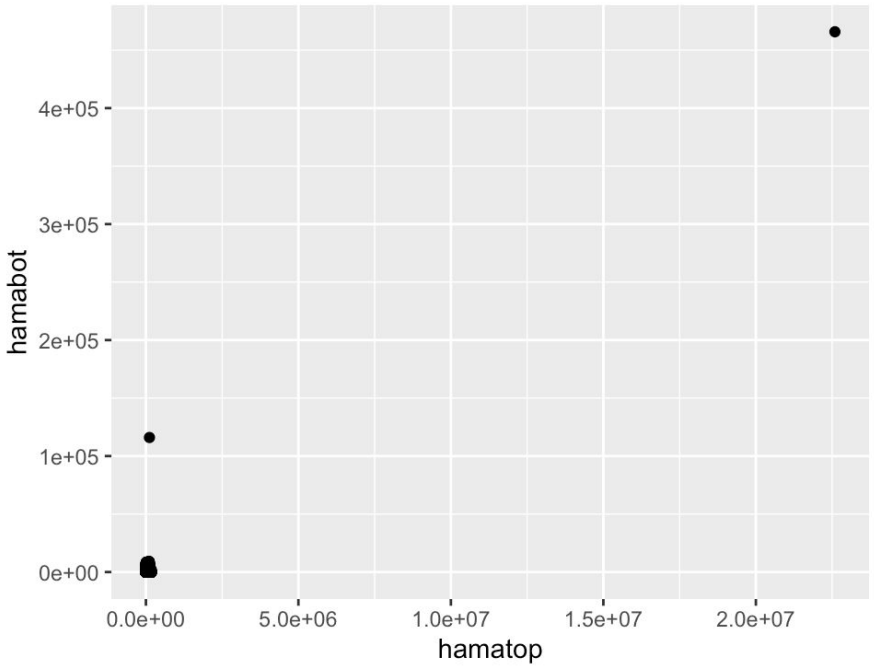
Lab 1: Using .gitignore

Please be sure to add a .gitignore file to the top directory of your `stat-215-a` repository:

- Useful examples here: https://github.com/github/gitignore
- Add what you don't want to be put in version control:
  - data/ (matches
  - documents/
  - *.csv
  - Exception: !dont_ignore_me.csv
  - .gitignore uses globbing patterns. See https://git-scm.com/docs/gitignore
- Citations: include in bibliography, but don't push pdfs

Lab 1: Findings

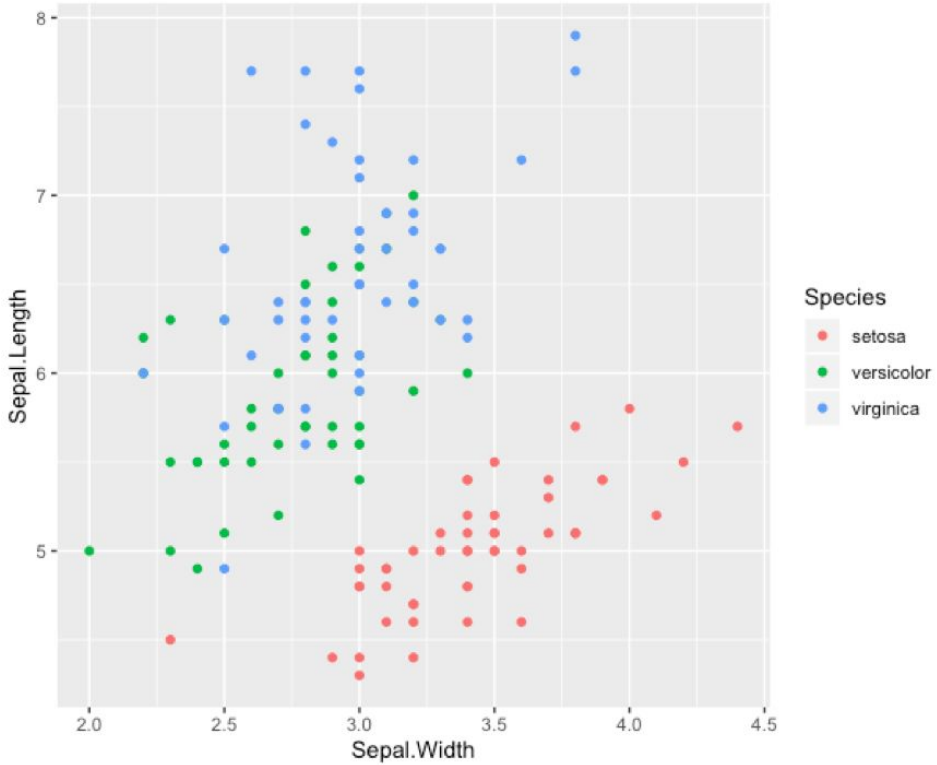




Lab 1: Check-in

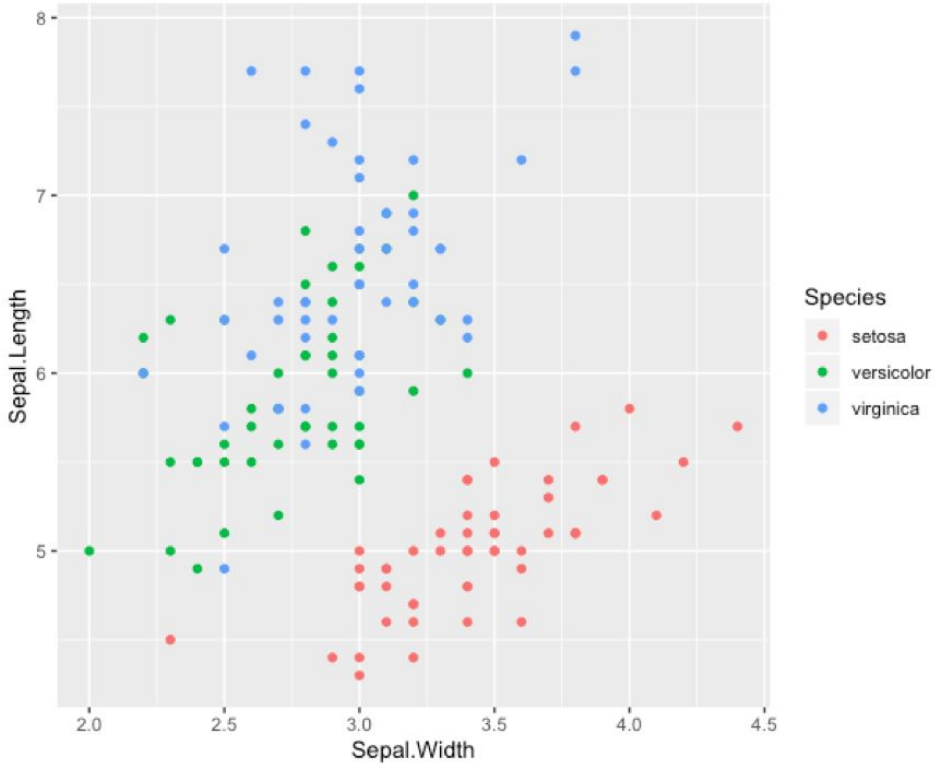
- How is it going?
- Having fun?
- Challenges?
- Questions?
- Remember it's due **Thursday, Sept 17 at 11:59pm!!**
- Berkeley SCF Resources: https://github.com/berkeley-scf

Motivation for today



(Selfish) motivation for today

As your GSI, it can become monotonous to look at 100+ plots with the same gridded gray ggplot background and the same default ggplot color scheme... please don't make me go through that



Let’s fix this

- Built-in and custom `ggplot` themes
- Color schemes
- Heatmaps with `superheat`
- `GGally` pair plots
- Ridge Density Plots
- Interactive plots

Quick improvements to the classic `ggplot` theme

- Recall in the gapminder lab last week, we had defined this `theme_nice` in utils.R

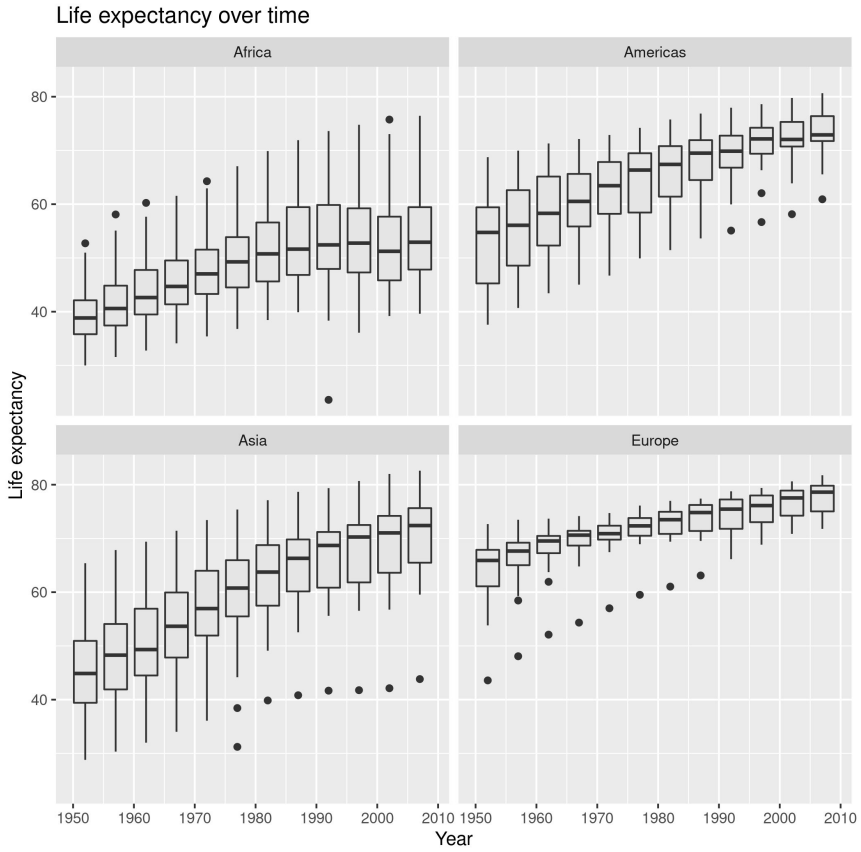
```
> theme_nice <- theme_classic() + theme(axis.line.y = element_blank())
```

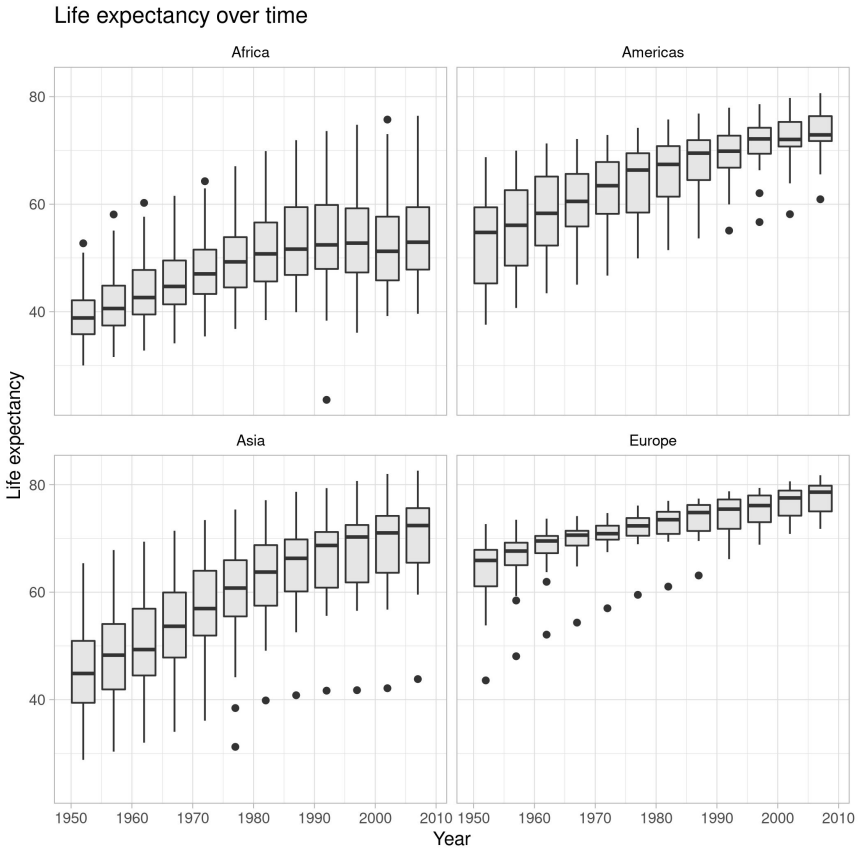
- Then to use this modified theme, we simply ran something like

```
> ggplot(gapminder %>% filter(continent != "Oceania")) +
+   facet_wrap(~continent) +
+   geom_boxplot(aes(x = year, y = life_exp, group = year), fill = "grey90") +
+   theme_nice
```

- Built-in ggplot themes: https://ggplot2.tidyverse.org/reference/ggtheme.html
- Or simply google “custom ggplot themes”

Custom `ggplot` themes with `theme()`





Color schemes

MONOCHROMATIC

ANALOGOUS

COMPLEMENTARY

SPLIT COMPLEMENTARY

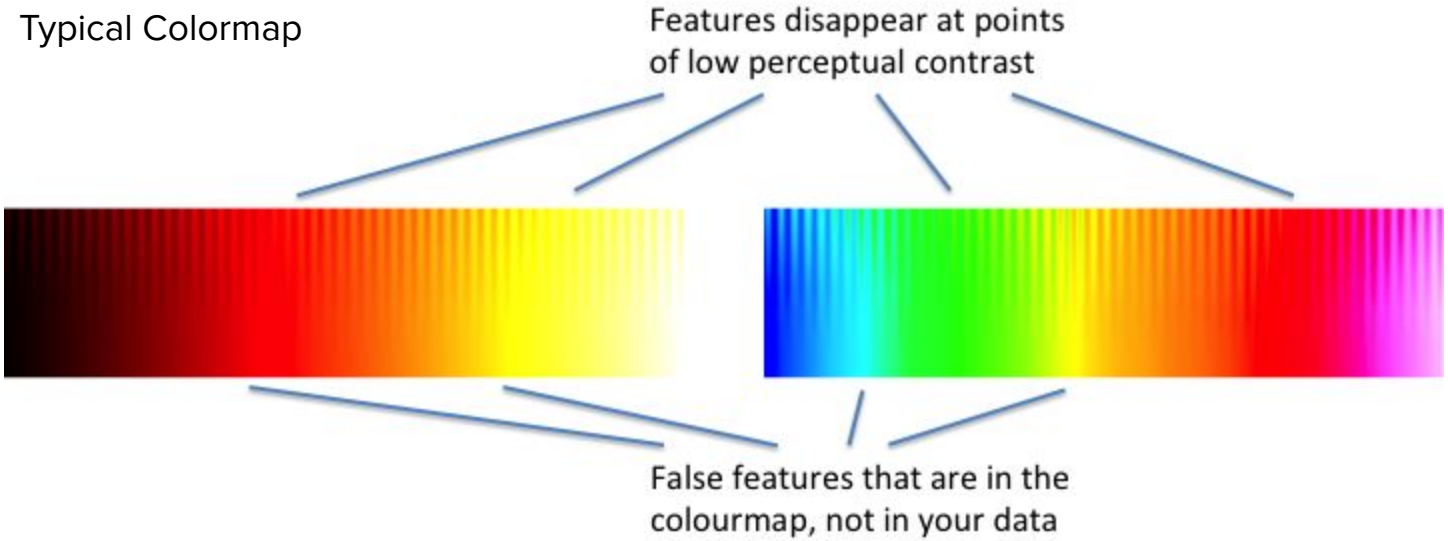
TRIAD

TETRAD

SQUARE

Color choice can lead to misleading visualizations

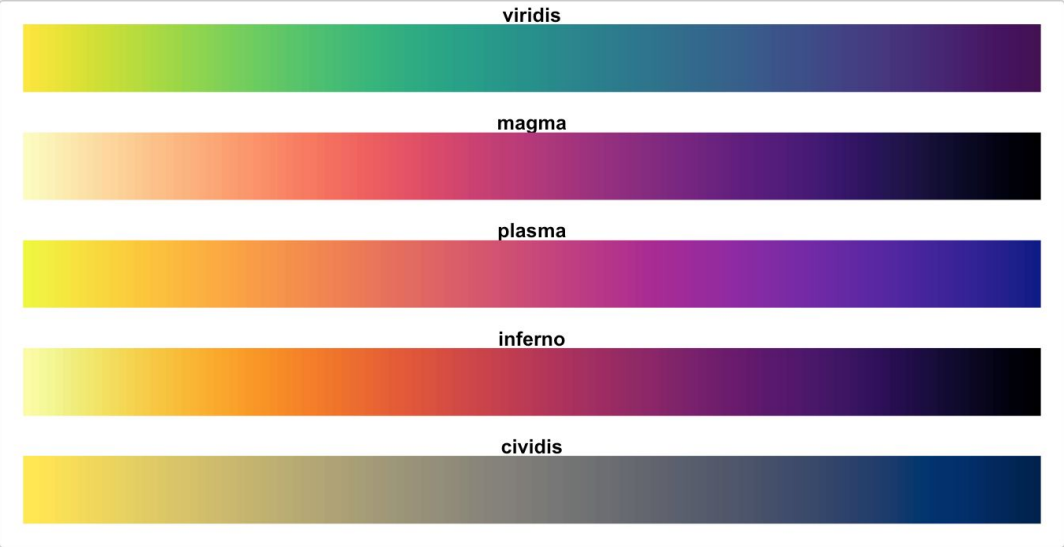
Typical Colormap



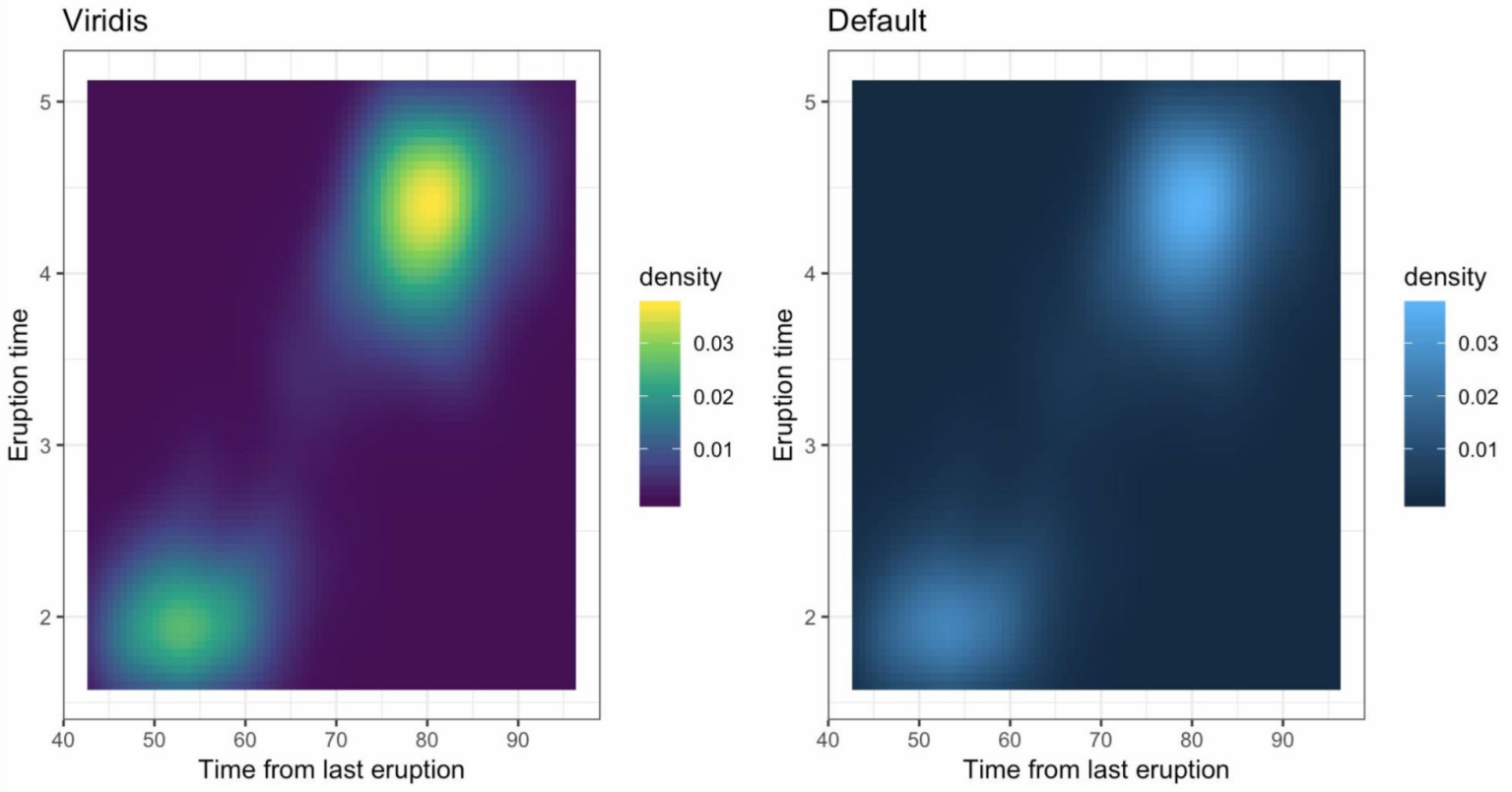
Perceptually Uniform Colormap

Viridis color scheme

- Makes pretty plots!
- Perceptually uniform colors (meaning changes in the data should be accurately decoded by our brains)
    - Another colormap with this quality is **RColorBrewer**
- Perceived by most common forms of color blindness



Viridis color scheme



Color schemes

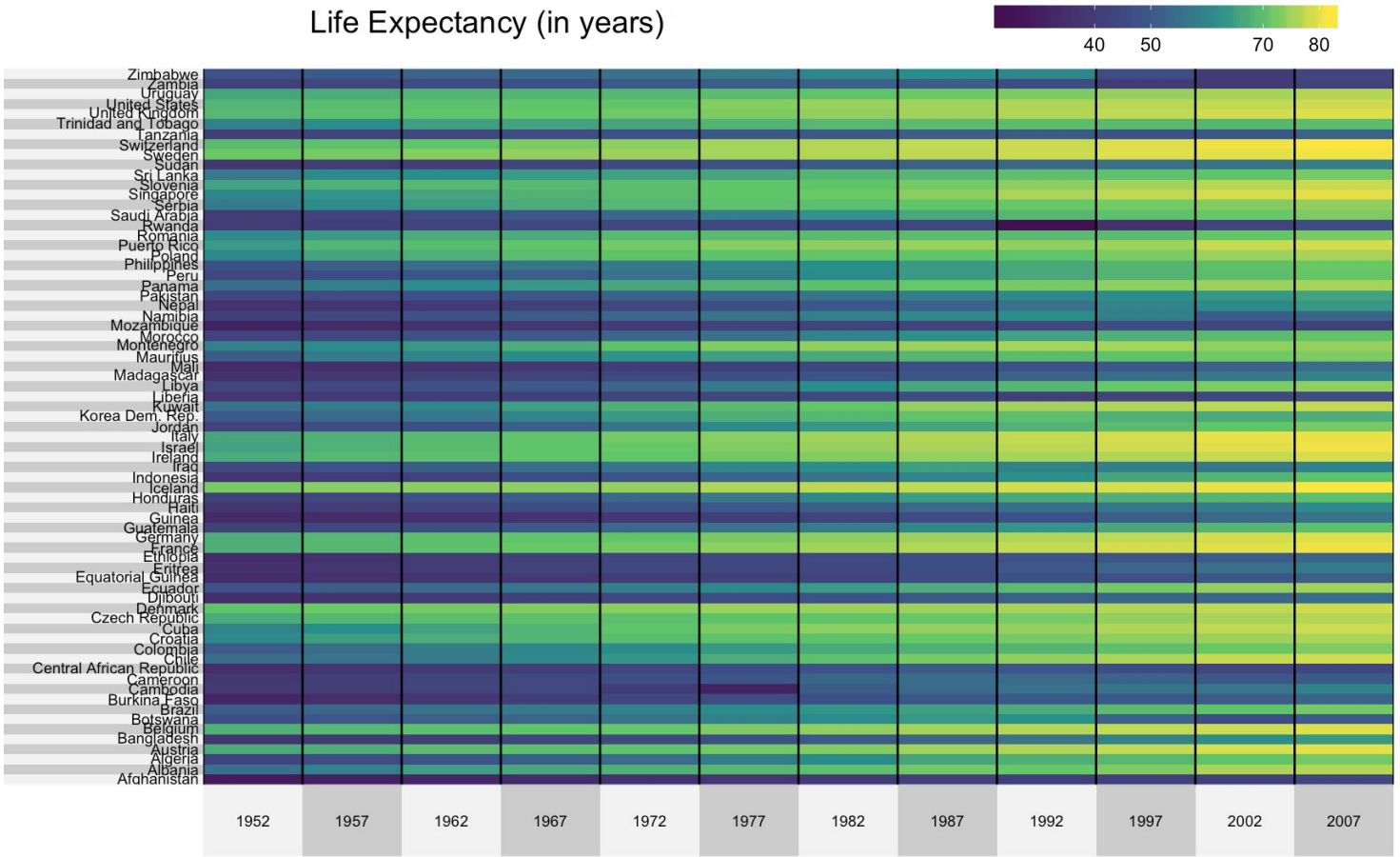
- Default color scheme in base R or ggplot is not always the best choice
- Think about what you are trying to convey in the plot
- Color choices can affect the way we perceive the plot
- Some helpful websites
  - https://coolors.co/app
  - http://colorbrewer2.org/
  - https://color.hailpixel.com/

Beyond the world of ggplot...

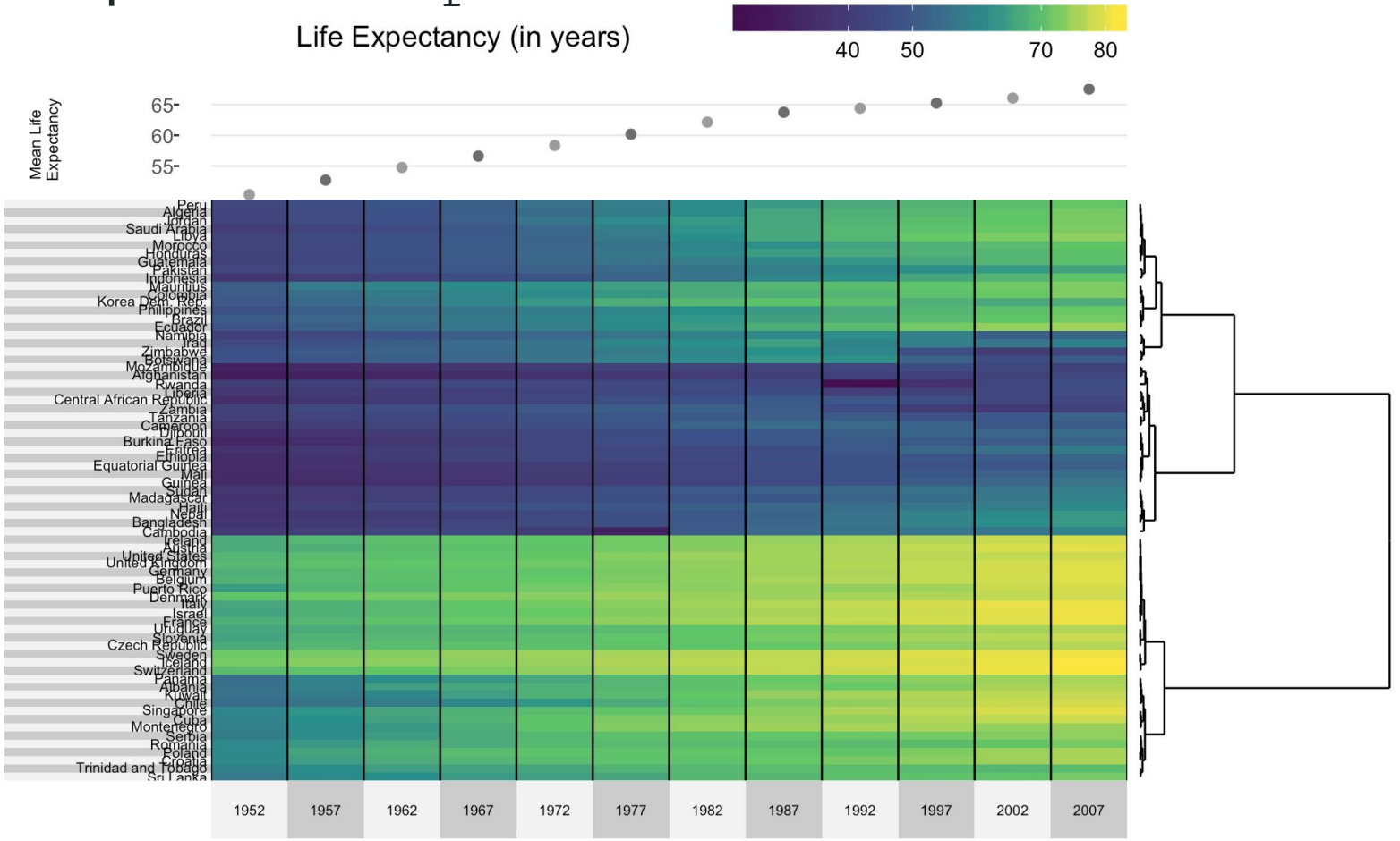
Heatmaps with `superheat`

```
install.packages("devtools")

devtools::install_github("rlbarter/superheat")

library(superheat)
```

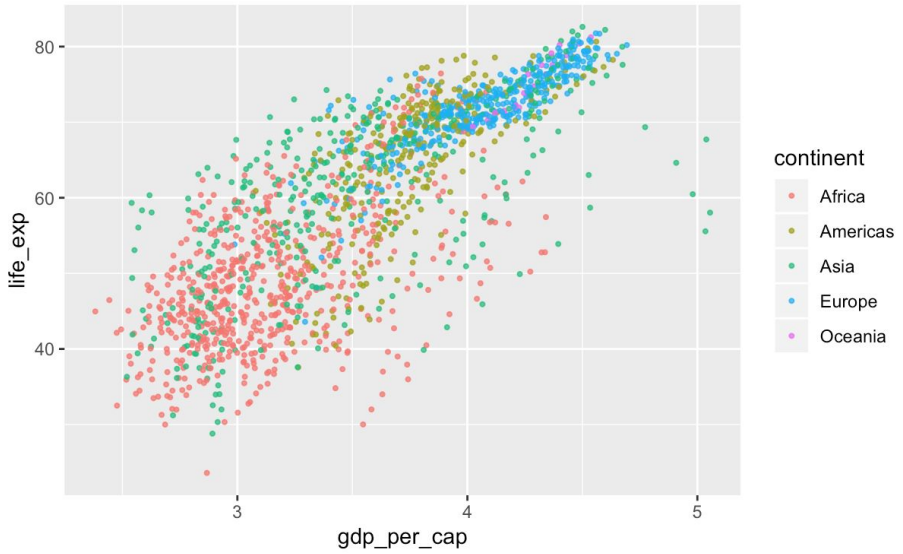
Heatmaps with `superheat`

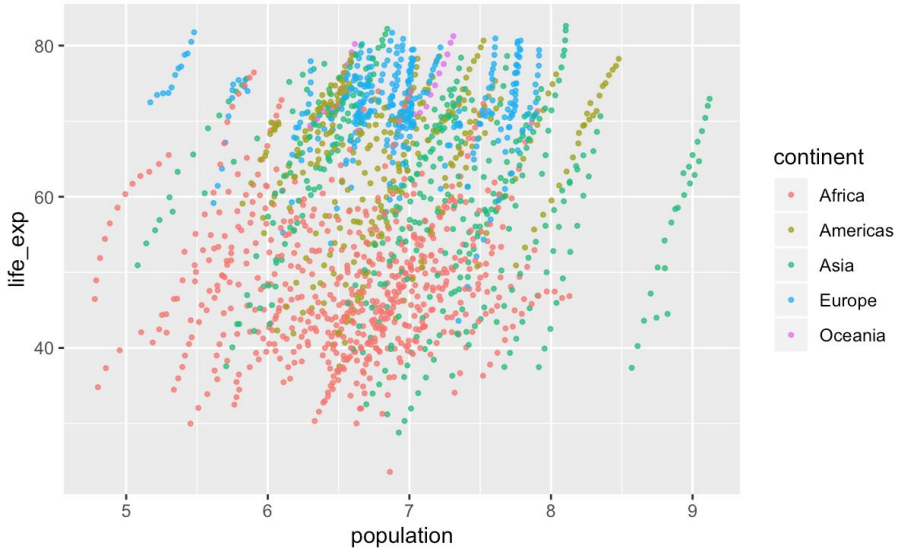


Heatmaps+ with `superheat`

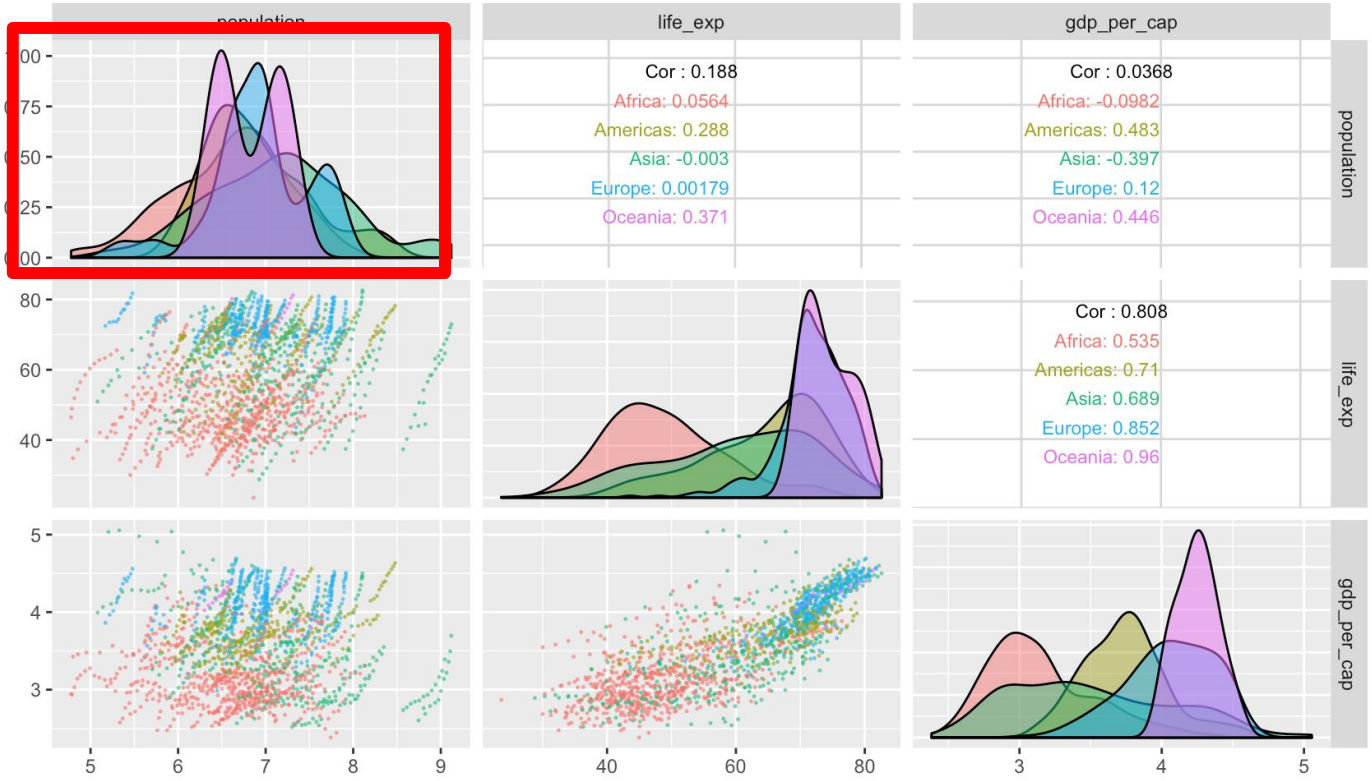


Pair plots


80
60
40
life_exp
3
4
5
gdp_per_cap
continent
Africa
Americas
Asia
Europe
Oceania

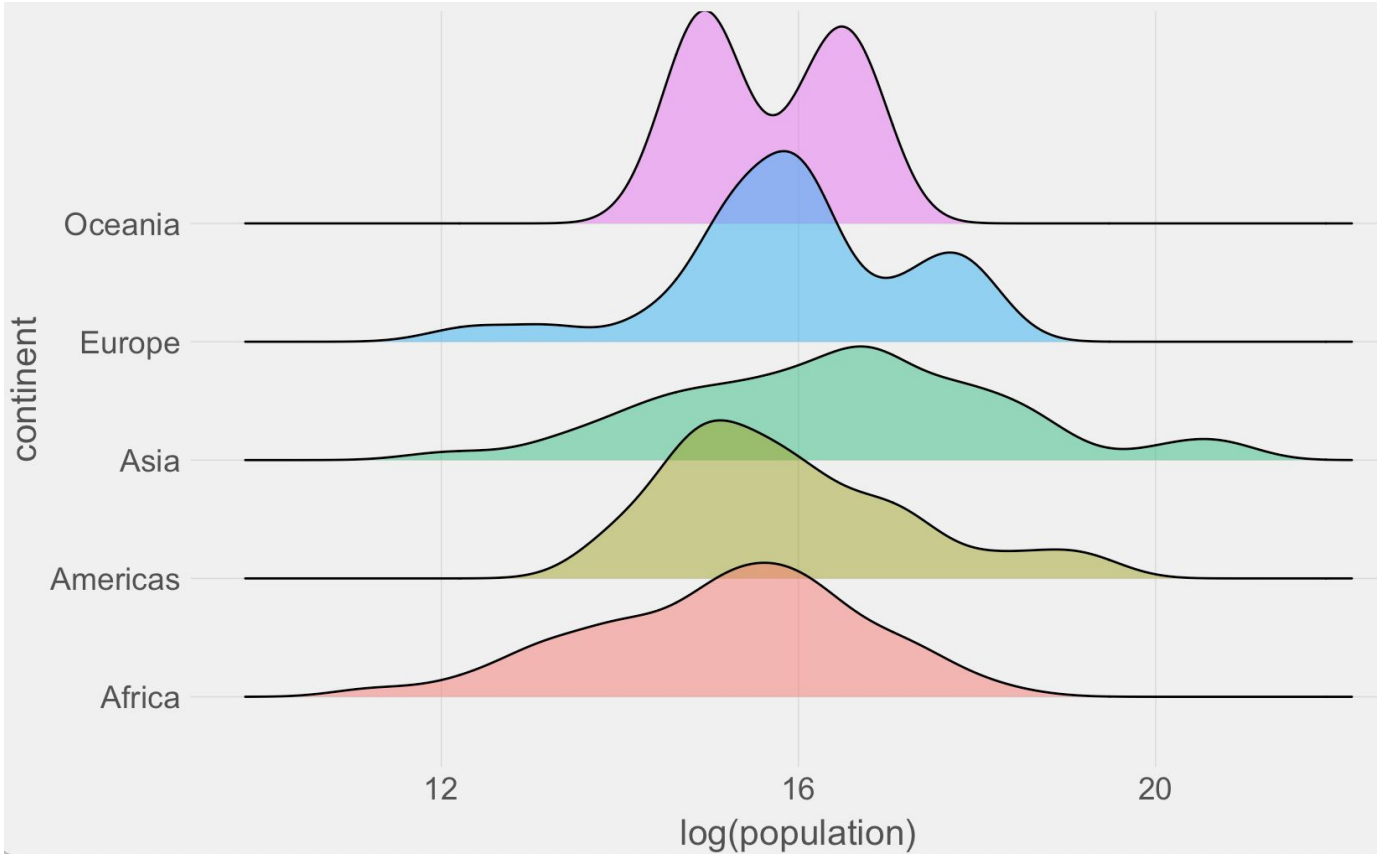

80
60
40
life_exp
5
6
7
8
9
population
continent
Africa
Americas
Asia
Europe
Oceania

Pair plots with `GGally::ggpairs`



- A word of caution: be wary of over-plotting; consider subsampling points, limiting the number of variables in pair plot, etc.

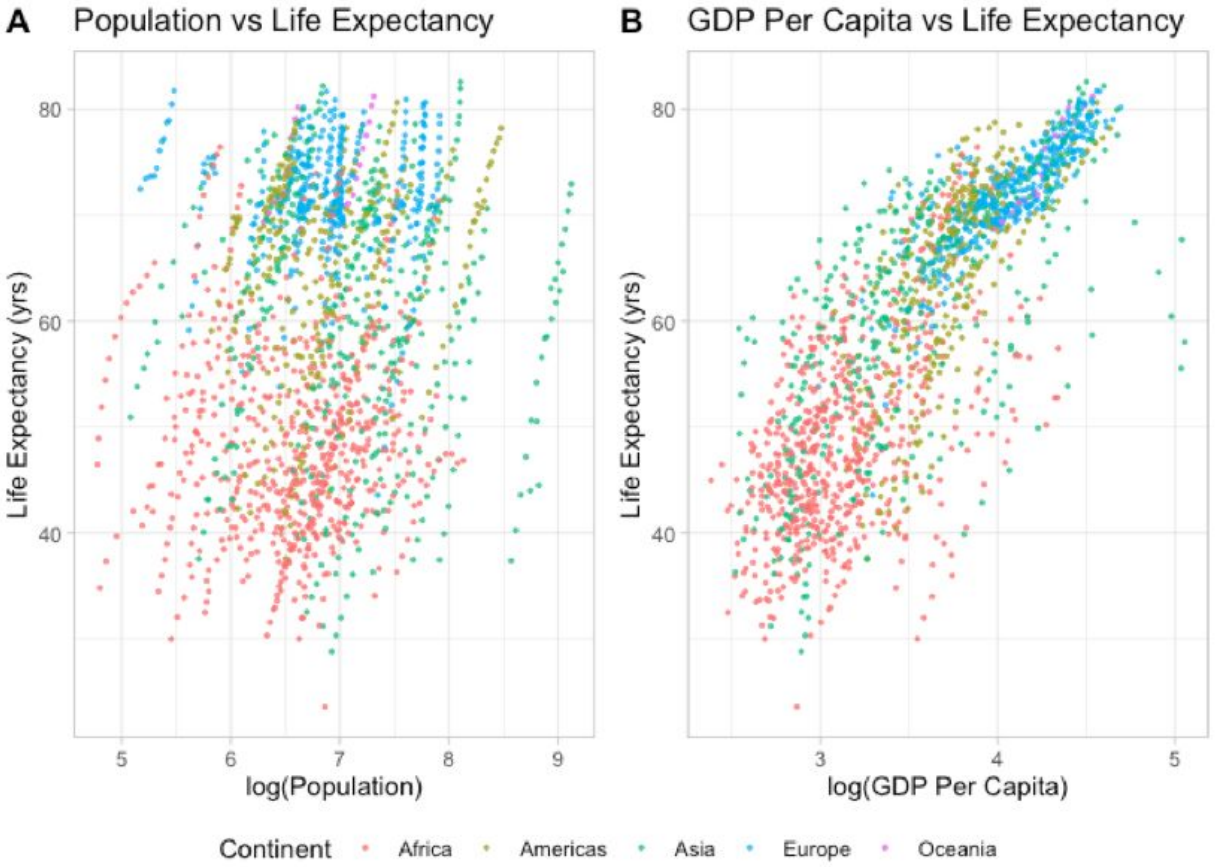
`ggridges`: another way of viewing multiple densities



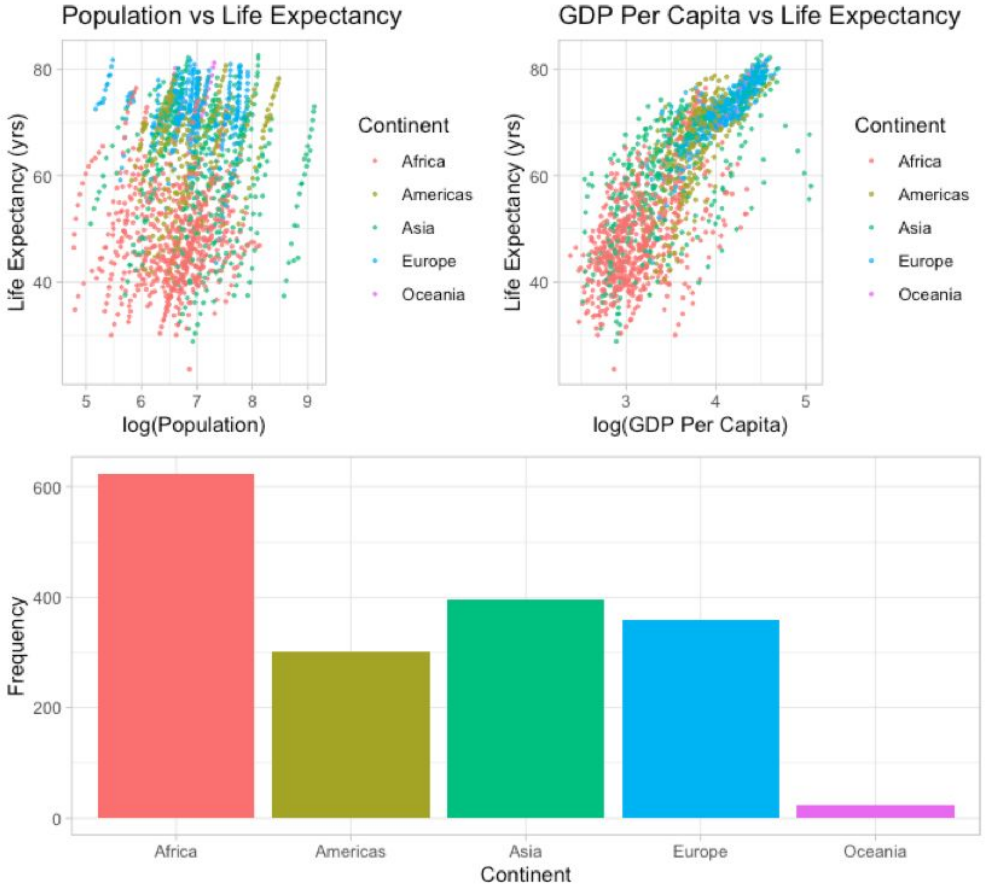
Creating sub-plots

- Two useful functions:
  - `ggpubr::ggarrange()`
  - `gridExtra::grid.arrange()`
- Can easily set a common legend and subplot labels with `ggarrange()`
- `grid.arrange()` is better for fancier “non-matrix” arrangements

ggpubr::ggarrange

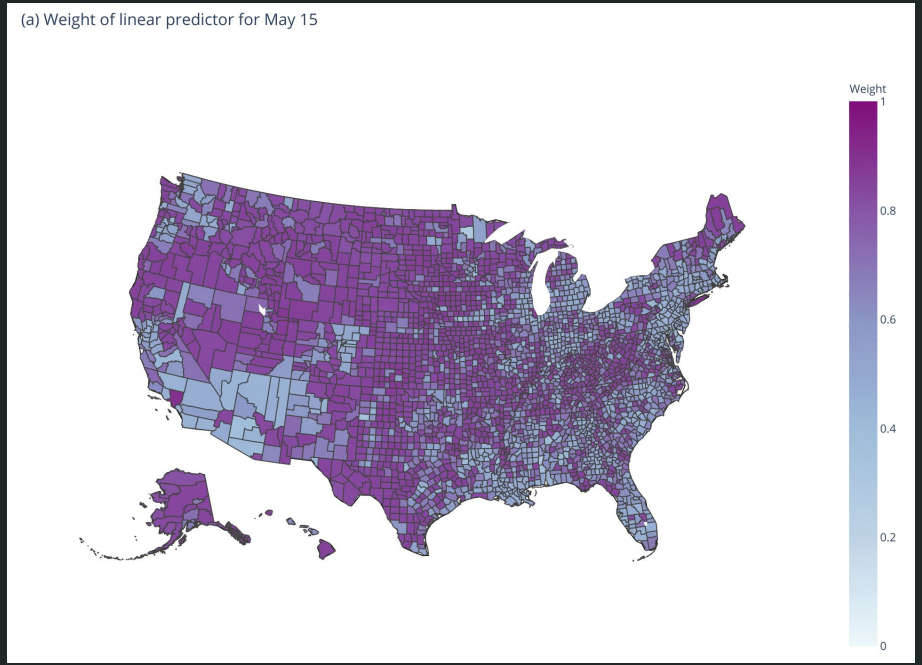


`gridExtra::grid.arrange`

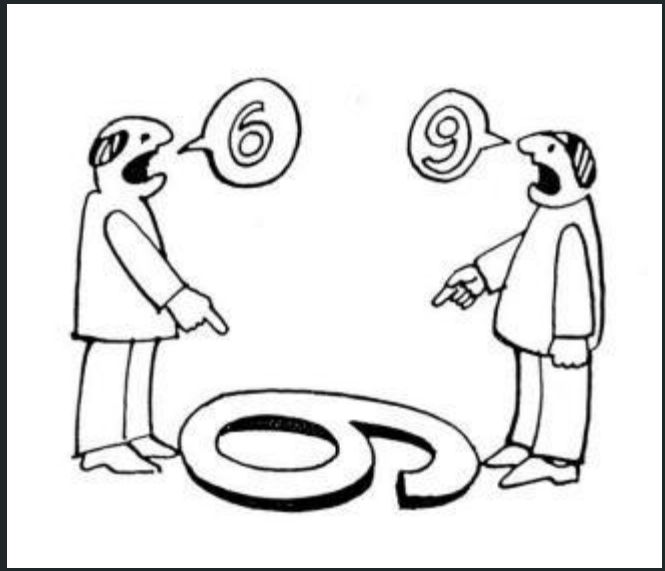


Interactive plots

- Shiny: https://shiny.rstudio.com/gallery
  - Tutorial: https://shiny.rstudio.com/tutorial/
- Plotly: https://plot.ly/r/
- Crosstalk: https://rstudio.github.io/crosstalk/using.html
- Highcharter: http://jkunst.com/highcharter/hchart.html



Probability perceptions



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