Introduction to Computational Tools and Techniques in Social Science

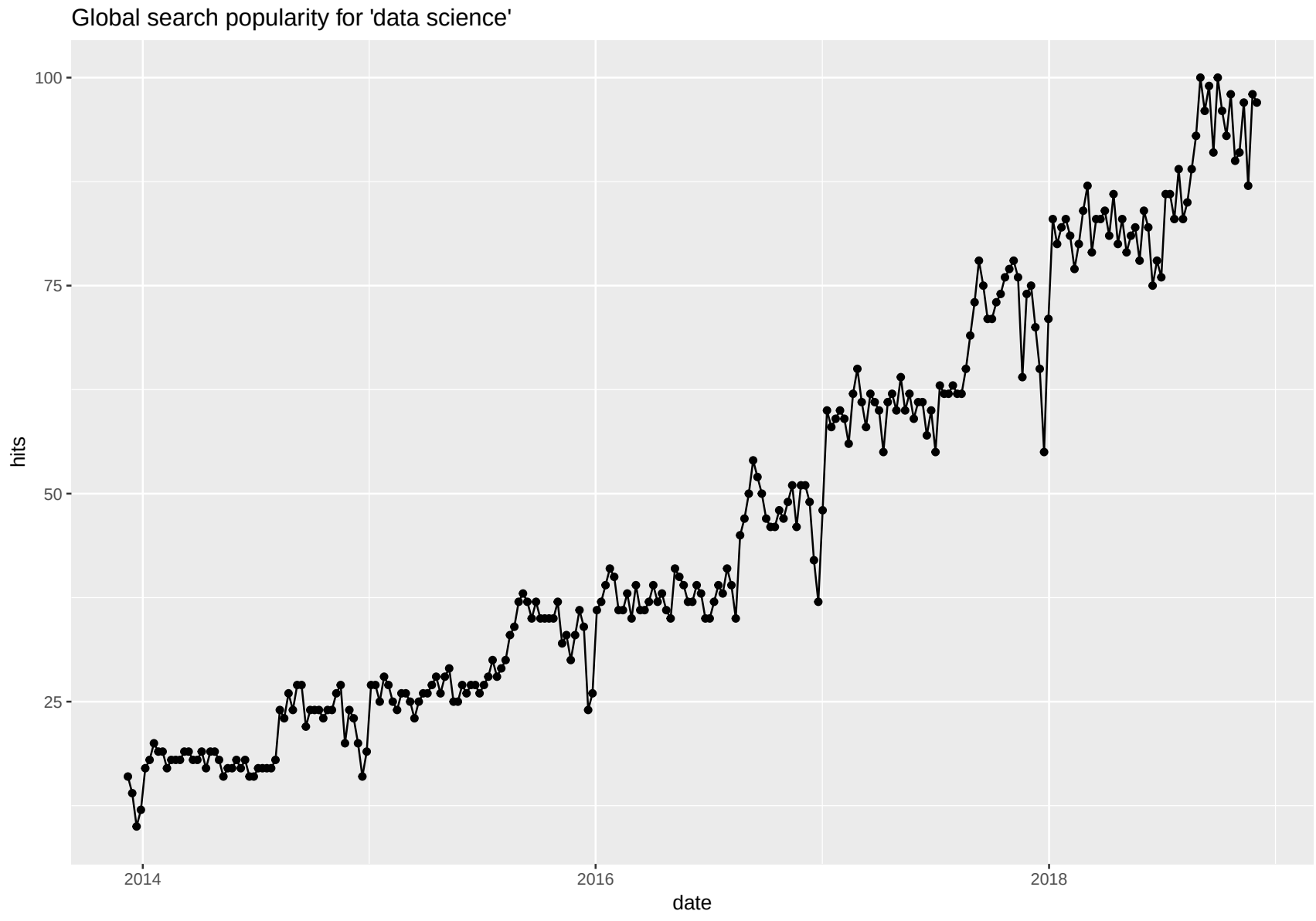
Jae Yeon Kim

06 December, 2018

About me

- Substantially, interested in historical comparative approaches to the study of race, ethnicity, and politics
- Methodologically, interested in using natural language processing and text analysis as a way of creating new data in race scholarship
- Also, a former tech industry person married to an engineer

Motivation


Global search popularity for 'data science'
100
75
50
25
hits
2014
2016
2018
date

- Why should we care?
- Yes, big data is a trend.
- But being good at computational tools and techniques has more immediate benefits.
- It can make your life **easy** and **organized**.
  - Don't repeat yourself: AUTOMATE!

- In addition, there are new tools for
  - Data collection (e.g., APIs, webscraping)
  - Analysis (e.g., machine learning)
  - Visualization (e.g., maps, social networks)
- In sum, you can do cool stuff.

- But it takes some **efforts** to take advantages of these new tools.
  - You need to learn how to code **a little bit**.
  - However, learning on your own is inefficient.
  - More important, you can get **bad** habits.

- The following examples are adapted from https://style.tidyverse.org

```
# Good
fit_models.R

if (y < 0 && debug) {
  message("y is negative")
}

# Bad
fit models.R

if (y < 0 && debug)
message("Y is negative")
```

```
# Good
do_something_very_complicated(
  something = "that",
  requires = many,
  arguments = "some of which may be long"
)

# Bad
do_something_very_complicated("that", requires, many, argu
                              "some of which may be long"
                              )
```

Objectives

- Tasting a wide range of computational tools
- Getting programming fundamentals right
  - Concepts
  - Techniques
- Learning by doing
  - Learning from your own MANY trials and errs
  - Learning from others (please, do Google search before asking me)

- Coding is similar to **cooking**.
  - So many different cuisines (programming languages).
  - But there are fundamentals.
    - Ingredients (data)
    - Techniques (logic)
    - Recipes (workflow)

- Bad habits are **bad**.
  - Rule 1. Thou shall comment.
  - Rule 2. Thou shall reuse functions (no copy and paste).
  - Rule 3. Thou shall practice version control (no final_final_final.Rmd).

- **Learn to learn**
- Specifically, we are going to learn:
  - How to use the command line in a UNIX environment
  - How to use Git to do version control
  - How ch use R to clean, wrangle, analyze, and visualize data (with a focus on Wickham's tidy data principles)
  - How to use R/Python to parse HTML, CSS, and Javascript for webscraping and (a bit of) Qualtrics (by Julia)
  - How to use R/Python to do text analysis and machine learning (guest lectures by two Berkeley Institute for Data Science fellows)

- **Don't expect**
  - Becoming a data scientist within one semester
  - I can answer all of your questions
- We focus on learning **how to learn**.
  - Programming is one endless Google Search (aka "Rochelle's Law")

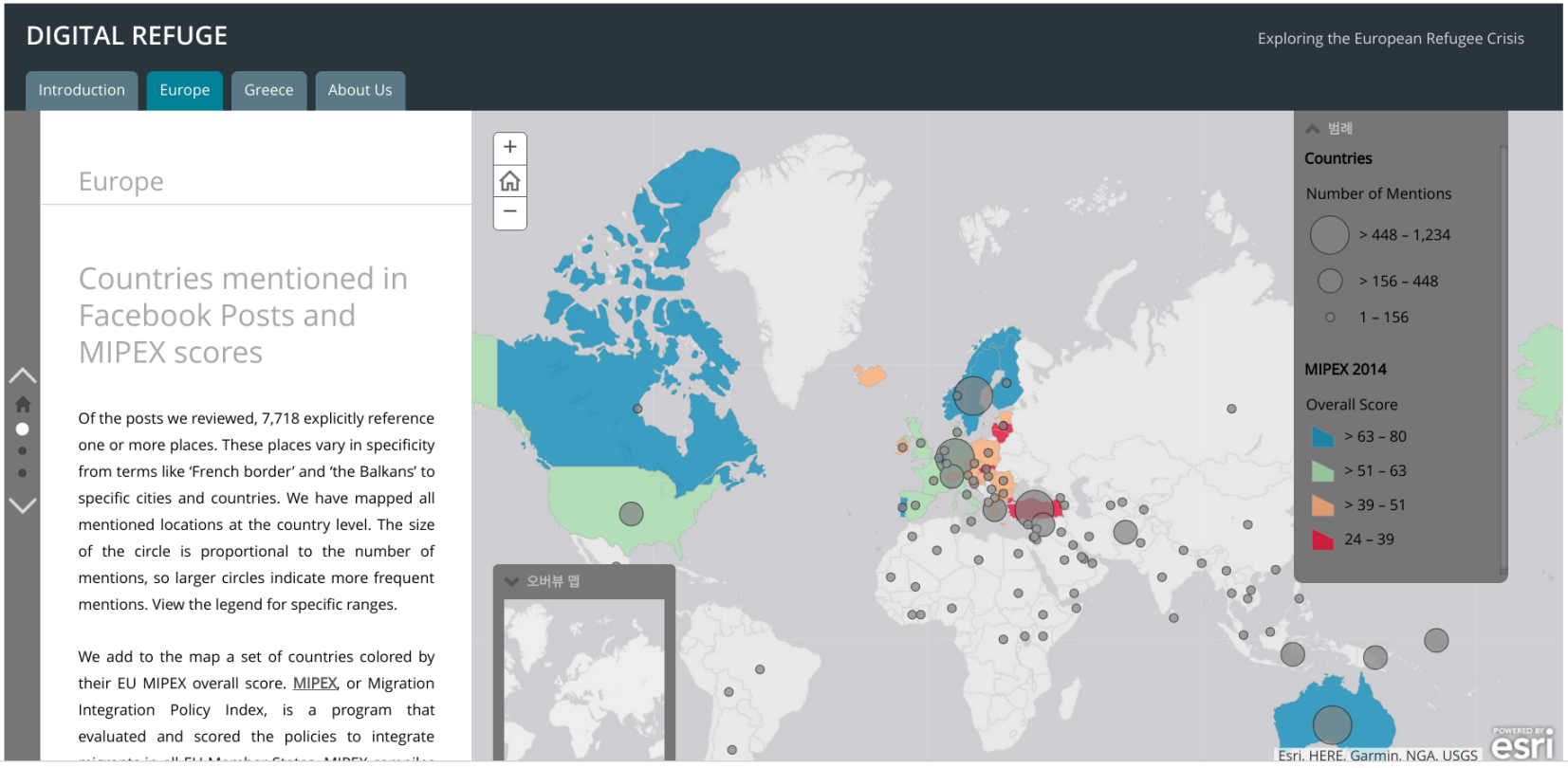
- Using Excel:
  - 3 mins for copying, pasting, and reorganizing one article
  - 80,000 newspaper articles
  - Taking **4,000** hours or **166 days**

- Using python:
  - A few hours for coding
  - Less than 5 mins for creating the dataset
  - Also, the code is reusable.

In [1]:

```
def parsing_proquest(x):

    # load libs

    from bs4 import BeautifulSoup

    import re

    # load file
    soup = BeautifulSoup(open(x,"r"), 'html.parser')

    # filter by strong tag
    doc = soup('strong')

    # save filtered results to new objects

    doc.text = soup.findAll(text=re.compile('Full text:'))
    doc.date = soup.findAll(text=re.compile('Publication year:'))
    doc.source = soup.findAll(text=re.compile('Publication date:'))
    doc.author = soup.findAll(text=re.compile('Publication info:'))
```

Previous final projects by students



Focus on best practice

- Good habits are **good**.
  - Commenting serves you and many other people.
  - Reusing functions provides opportunities to learn and clean up your mess.
  - Practicing version control is how we become a mature researcher and a coder.

Class

- Participation (25%)
  - Be nice to each other. We're all learning (especially me).
- Homework (50%)
  - Every week.
  - Learning how to code is like learning how to drive.
- Final project (25%)
  - Feasibility is your friend. Late Feb proposal, April presentations.

Logistics

- Learning by doing
- Pair-programming on in-class challenges
- Section is required
- Julia Christensen is a technical assistant to the course.

Special thanks

- Laura Stoker (UC Berkeley) for supporting this course at its initial developmental stage
- Rochelle Terman (Chicago) for creating this course
- Rachel Bernhard (Oxford, UC Davis) for continuing this course