QSS20: Modern Statistical Computing

Session 0101: Intro and Setup

Goal for today's session

- Course goals
- Intros
- Break
- Nuts and bolts
- Residual tech setup

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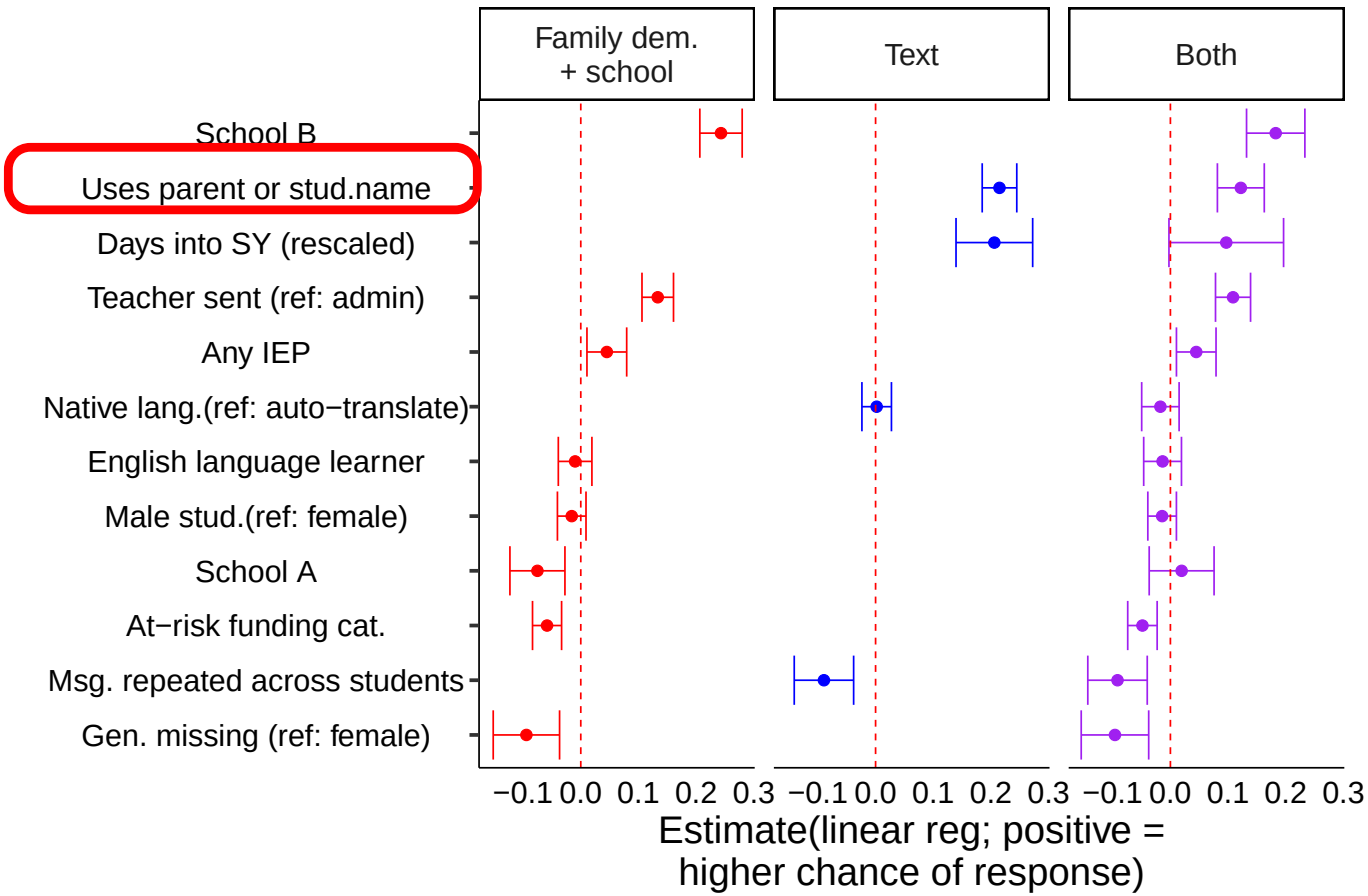
Broad goals

- Build upon your introductory programming course and to equip you with the computing literacy to conduct social science research in the age of "big data."
- Two components
  1. **Workflow tools:** Git/GitHub; LaTeX; basic bash scripting
  2. **Programming in messy contexts:** applied tasks in Python (data wrangling; basic text analysis; basic geospatial); some SQL

An example

Graph from a recent talk; box in red shows that parents are more likely to respond to text messages from teachers when the teacher uses the parent or their child's name:

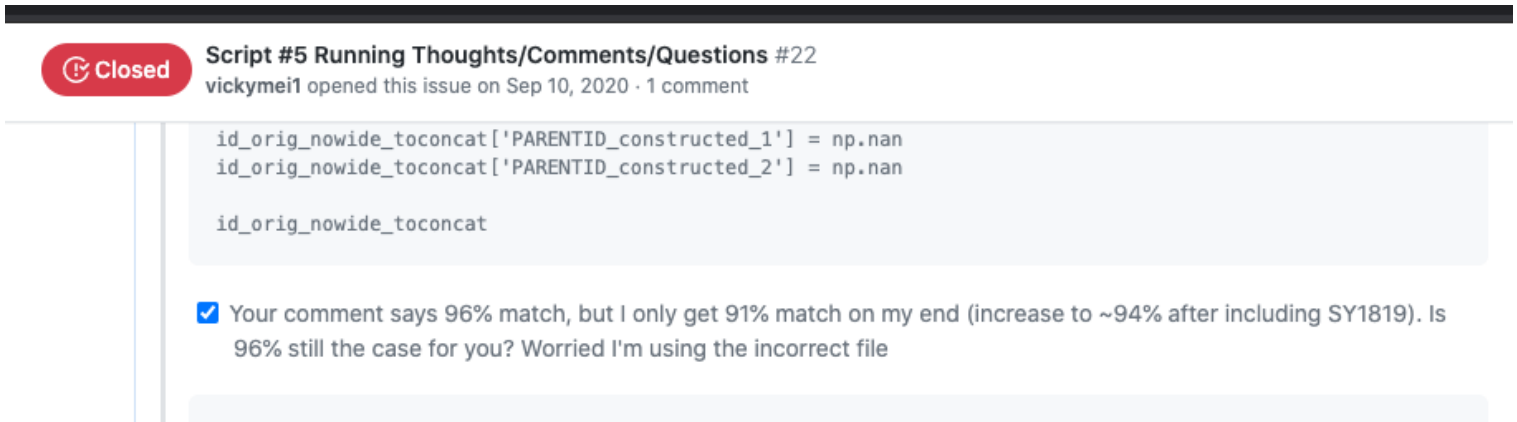


Beyond the statistics, series of workflow and programming tasks before running regression

1. **Acquire the data:**
   - **Ideal:** csv or database
   - **Real:** excel file w/ variable number of tabs and spaces in column names; pdfs containing text; website
2. **Clean the data:**

p_name	s_name	msg_content
Rebecca Johnson	Jennifer Johnson	Hi Ms. Johnson! Jenny did great on her math test.
Rebecca Johnson	Jennifer Johnson	Hello Rebecca- I'm concerned about Jennifer's grades.

3. **Reconcile different decisions in data cleaning:**



How does QSS20 fit with other courses you might have taken/will take?

- **Data wrangling and visualization but focus on R:**
  - QSS17 (Data visualization): tidyverse; ggplot
  - QBS181 (Data wrangling): R and SQL
- **Deeper dives into the statistics/analysis side:** stats prereqs; some courses in COSC more focused on theory behind machine learning
- And to summarize your feedback on redundancies/newer topics...

To reiterate the workflow before data are usable...

```
resp_file = pd.read_csv("../public_data/QSS20_remotepreferences (Responses) - Form Responses 1.csv")
```

```
raw_colnames = resp_file.columns.to_list()
raw_colnames
```

```
['Timestamp',
 'Email Address',
 'Score',
 'What is your preferred name?',
 'Will you be on campus or remote this term?',
 'Do you expect to have reliable internet access for accessing Slack and the Dartmouth VPN (if needed)?',
 'Do you expect to have reliable internet access to participate in the synchronous sessions (5:00-6:50 PM EST, Tuesda
ys and Thursdays)?',
 'What kind of device will you be able to use for programming assignments? Select all that apply',
 'Please tell me the time zone in which you will be living during the term. If different than Eastern time, how many
hours behind or ahead are you? *',
 'Do you have any concerns about accessing resources, including basic needs (food, shelter, medical care), psychologi
cal care and counseling, or access to technology that you wish to share with me?',
 'Reviewing the syllabus topics at this link: https://rebeccajohnson88.github.io/qss20/docs/course_schedule.html. Wha
t topic do you feel is the most new/valuable for you?',
 'For those same syllabus topics, what topic do you feel is the most review / redundant with your past coursework?',
 'In past data analysis or programming courses, what was one thing that was MOST HELPFUL for helping you get through
difficult material?',
 'In past data analysis or programming courses, what was one thing that was LEAST HELPFUL for helping you get through
difficult material?',
 'So that I can gear practice problems/examples to your interests, what are your general career goals? Select all tha
t apply!',
 'A lot of our examples will be drawn from intersections of data science and public policy. Which of the following po
licy domains are most interesting to you?',
 'Do you have any additional questions or concerns about moving to online classes that you would like to share with m
e?']
```

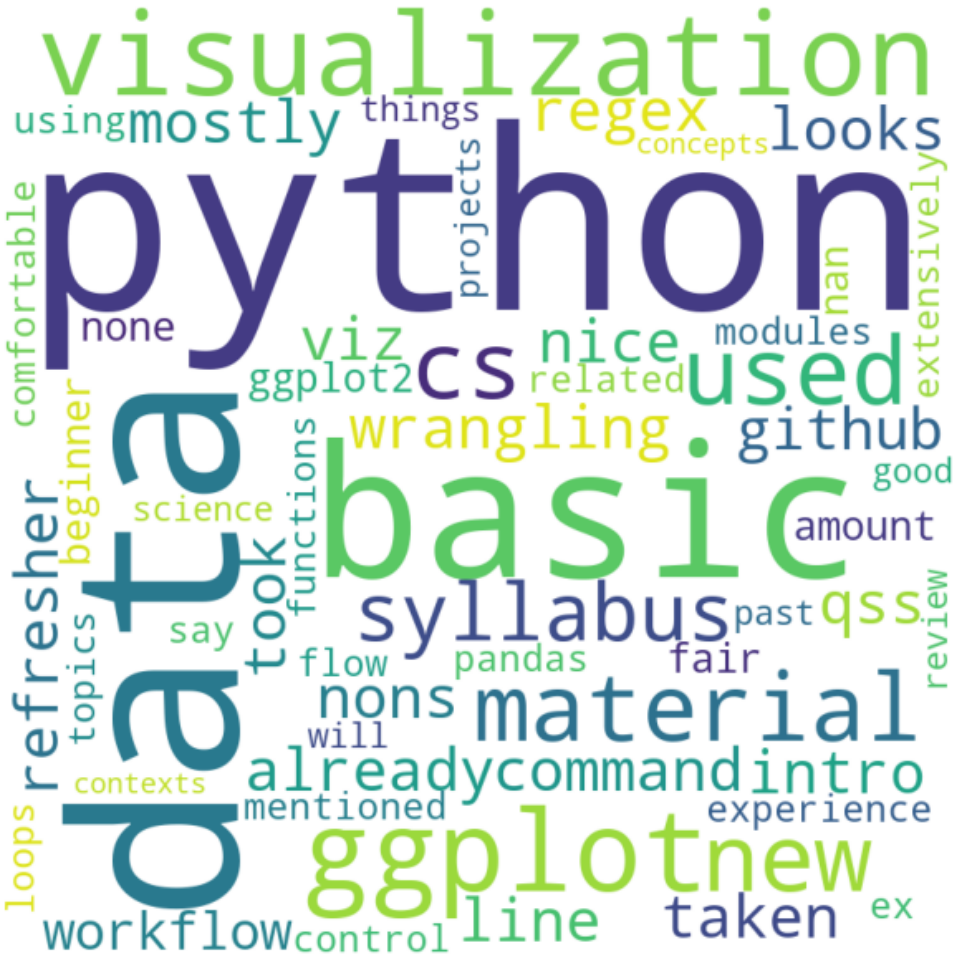
To reiterate the workflow before data are usable...

```
def clean_onecol(one_col: str,
                 cutoff = 5):
    """
    Take in a messy column name and return a
    cleaned one

    @param one_col: Messy column name
    @param cutoff: number of tokens to cut the string at (default 5)

    @return:  clean column name
    """

    l = one_col.lower()
    l_nosp = re.sub(r"\s+|\,|\/|\(|\)|\?|\.", '_', l)

    ## tokenize
    l_nosp_token = l_nosp.split("_")

    ## if longer, add some remainder back in to
    ## differentiate similar q's
    if len(l_nosp_token) > cutoff+5:
        random.seed(2021)
        l_short = "_".join(l_nosp_token[:cutoff]) + \
                  "_".join(random.sample(l_nosp_token[cutoff:], 5))

    ## otherwise keep short
    else:
        l_short = "_".join(l_nosp_token[:cutoff])
    return(l_short)
```

Based on your feedback, topics that need MORE coverage

- Lots of interest in SQL
- APIs, web scraping, and other data acquisition methods
- More on git, command line, and other non-Anaconda ways of interacting with Python

Based on your feedback, topics that need LESS coverage

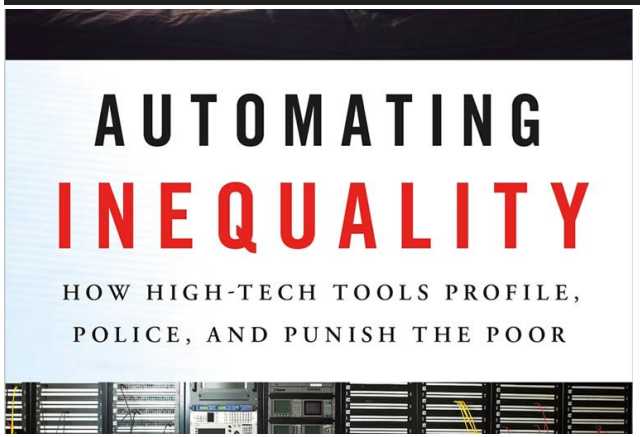


- Good handle already on ggplot (we'll still have some viz stuff using the plotnine wrapper but can then move more quickly to interactive visualization)
- Python basics from COSC 1 (may condense first few weeks to get to newer content more quickly/focus on more complex data science applications)

Overarching goal: transparency and reproducibility

Why do those matter? Data science in high-stakes contexts

Misuses of data science:



Promoting responsible and equitable data science:

DATA FOR BLACK LIVES

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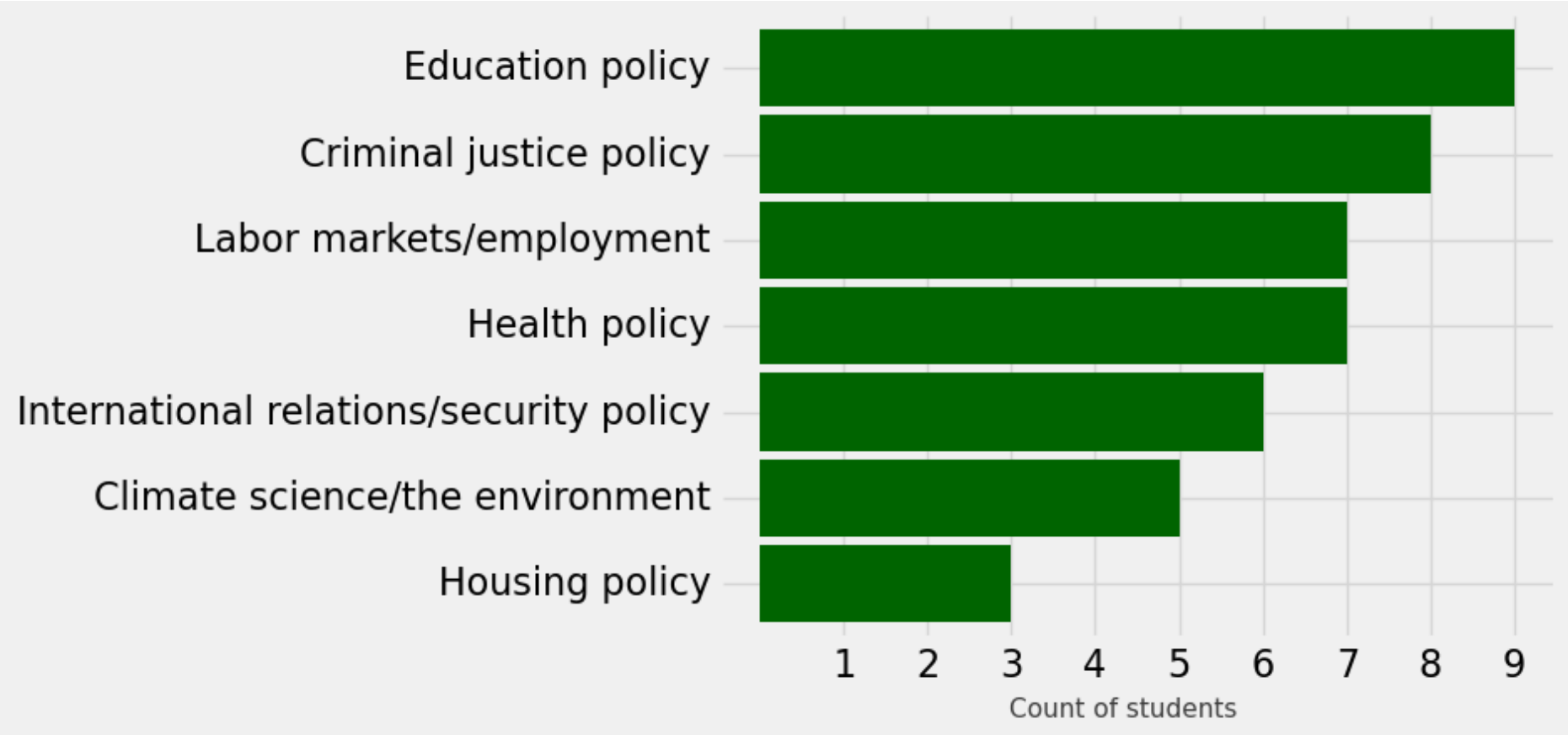
General policy interests



Going around....

- Name
- Favorite class at Dartmouth thus far and why?
- If you could have any data source at your disposal, what would it be and what's a question you would ask?

A bit about me

Where	What	Languages
	Psychology; economics; MA in ethics/philosophy; internships in consulting	
	Research fellow at NIH dept of bioethics	None
	PhD in sociology, demography, and social policy	
	Data scientist	

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Course website: most authoritative guide

Please make sure to read the following pages most closely (can click on links in posted slides):

1. **Evaluation and grading**: https://rebeccajohnson88.github.io/qss20/docs/eval_grades_py.html- covers four late days and exact grade breakdown
2. **Software setup**: https://rebeccajohnson88.github.io/qss20/docs/software_setup.html
3. **Social impact practicum context**: https://rebeccajohnson88.github.io/qss20/docs/sip_finalproject.html
4. **Course schedule (more subject to change):** https://rebeccajohnson88.github.io/qss20/docs/course_schedule.html

Enrollment and waitlist

- **If enrolled**: due to the intensive nature of the course, please ideally decide by Thursday 04.08 if you're going to stay enrolled (will try to release first pset by Wednesday 04.07) so that we can use all spots
- **If waitlisted**: will update you as slots change; next offered Winter 2022

Course components

1. **Most important - synchronous sessions:** lab-based rather than lecture-based; hands-on practice with more advanced applications / work on problem sets
2. **Slack**
3. **Office hours**
4. DataCamp for review/basic syntax
5. Two problem sets
6. Social Impact Practicum/final project

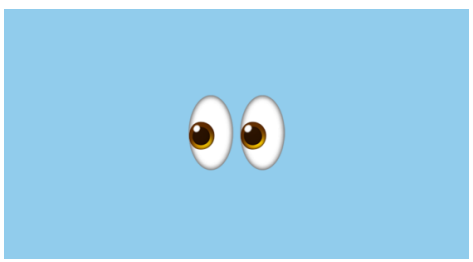
Synchronous sessions structure of typical in-class session

Time window	What
5:00-5:30	Slides or review of tutorial on course website; DataCamp questions
5:30-5:45	Break and get into breakout rooms
5:45-6:30	Work with assigned group on in-class tutorial or problem set in breakout rooms; I'll circulate around
6:30-6:50	Reconvene as a group and go over questions; outline any prep for next class

Might deviate as we have visitors (currently, only visitors related to SIP practicum; might have guest speakers working in data science and public policy if there's interest and if we have spare course time)

Slack: course communication

- `#general_qss20` for announcements
- Join by clicking link on Canvas
- Please add an image and preferred pronouns to your profile
- **Expectations:**
  - If in doubt, always default to a public channel so that others can benefit from your question
  - **DMs to me**: only for family emergencies and other personal issues
  - I will respond within 24 hours on weekdays; by Monday AM on weekends; before a problem set is due, will respond to all questions posted before **3 pm** on due date but not questions between 3 pm and midnight when due
  - Means that I've seen your message and am thinking:



Office hours

- **My office hours**
  - When2meet for people's availability (will then set stable time): https://www.when2meet.com/?11426443-RkPV5
  - Sign up via Calendly link I'll post/pin on Slack. Two formats:
    1. 1 hour of virtual office hours on zoom
    2. 1 hour of in-person office hours: if interest; Blunt Hall room 205; general campus quarantine rules apply and need to either arrive at beginning of hour or middle of hour
- Jianjun office hours: Mondays 2-4 pm EST and available on email

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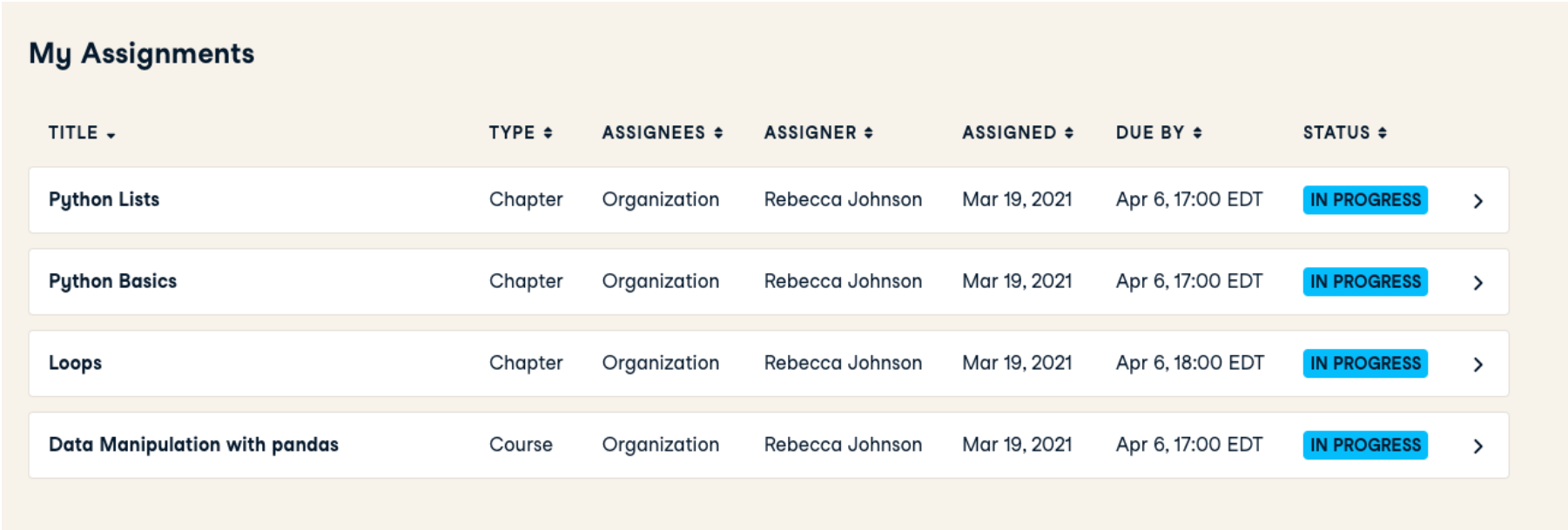
DataCamp: make sure to join via our specific course pages so assignments show up

Post on `#datacamp_questions` if you need your name-based Dartmouth email added rather than your id-based email



My Assignments

TITLE	TYPE	ASSIGNEES	ASSIGNER	ASSIGNED	DUE BY	STATUS
Python Lists	Chapter	Organization	Rebecca Johnson	Mar 19, 2021	Apr 6, 17:00 EDT	IN PROGRESS
Python Basics	Chapter	Organization	Rebecca Johnson	Mar 19, 2021	Apr 6, 17:00 EDT	IN PROGRESS
Loops	Chapter	Organization	Rebecca Johnson	Mar 19, 2021	Apr 6, 18:00 EDT	IN PROGRESS
Data Manipulation with pandas	Course	Organization	Rebecca Johnson	Mar 19, 2021	Apr 6, 17:00 EDT	IN PROGRESS

Meant as auxiliary tool/playing a minor role so that you're prepared for in-class activities and so we don't need to review basic syntax. So graded on completion-only basis and only 5% of grade, but if you'd prefer to skip, can reapportion the 5% to pset 2

Two problem sets

- Will release 1 week before pset 1; at least 1.5 weeks before pset 2
- **Problem set one: due Thursday 04.15 at midnight:** Group submits a single submission for the group problems; you submit your own for the individual problem(s). Will have anonymous feedback survey on group participation that I weight into group portion of grade.
- **Problem set two: due Thursday 05.13 at midnight**
- **For each**:
  - Start well in advance and space out the parts (Pset 1 should be largely review from COSC 1 and the initial DataCamp modules)
  - May devote some class time pre deadline to work on the pset/answering questions
  - May provide intermediate/cleaned data so that getting stuck on early parts doesn't impede later parts

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What's a SIP?

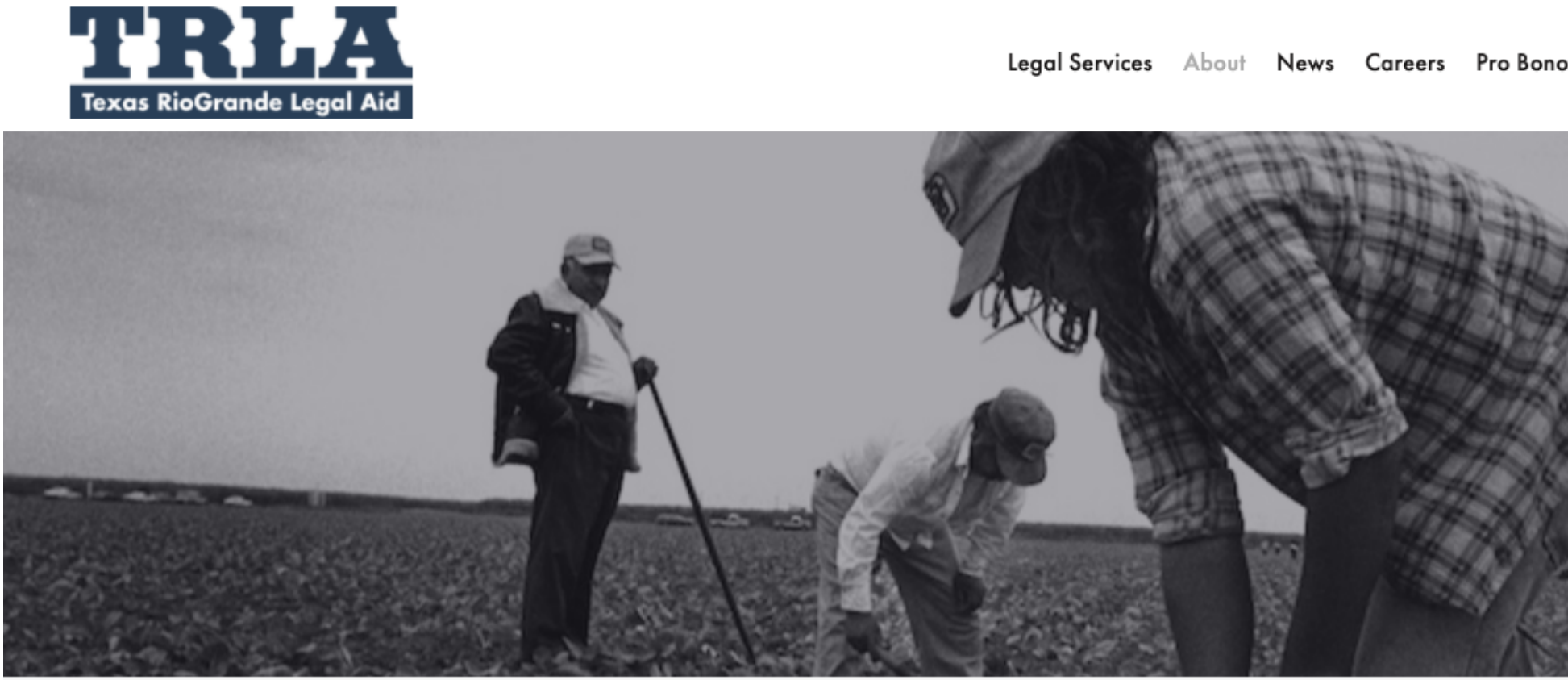
- Sponsored by Dartmouth Center for Social Impact
- From them:

  A Social Impact Practicum (SIP) is a project-based experiential learning opportunity connecting undergraduate courses at Dartmouth with community needs identified by nonprofit organizations throughout the Upper Valley.
  In other words, a SIP is a real-world project with real-world impact.

- Can find a database of other SIPs here: https://students.dartmouth.edu/social-impact/programs-initiatives/students/social-impact-practicums-sips/social-impact-practicum-sip-course

Partner organization: Texas RioGrande Legal Aid

https://www.trla.org/who-we-are



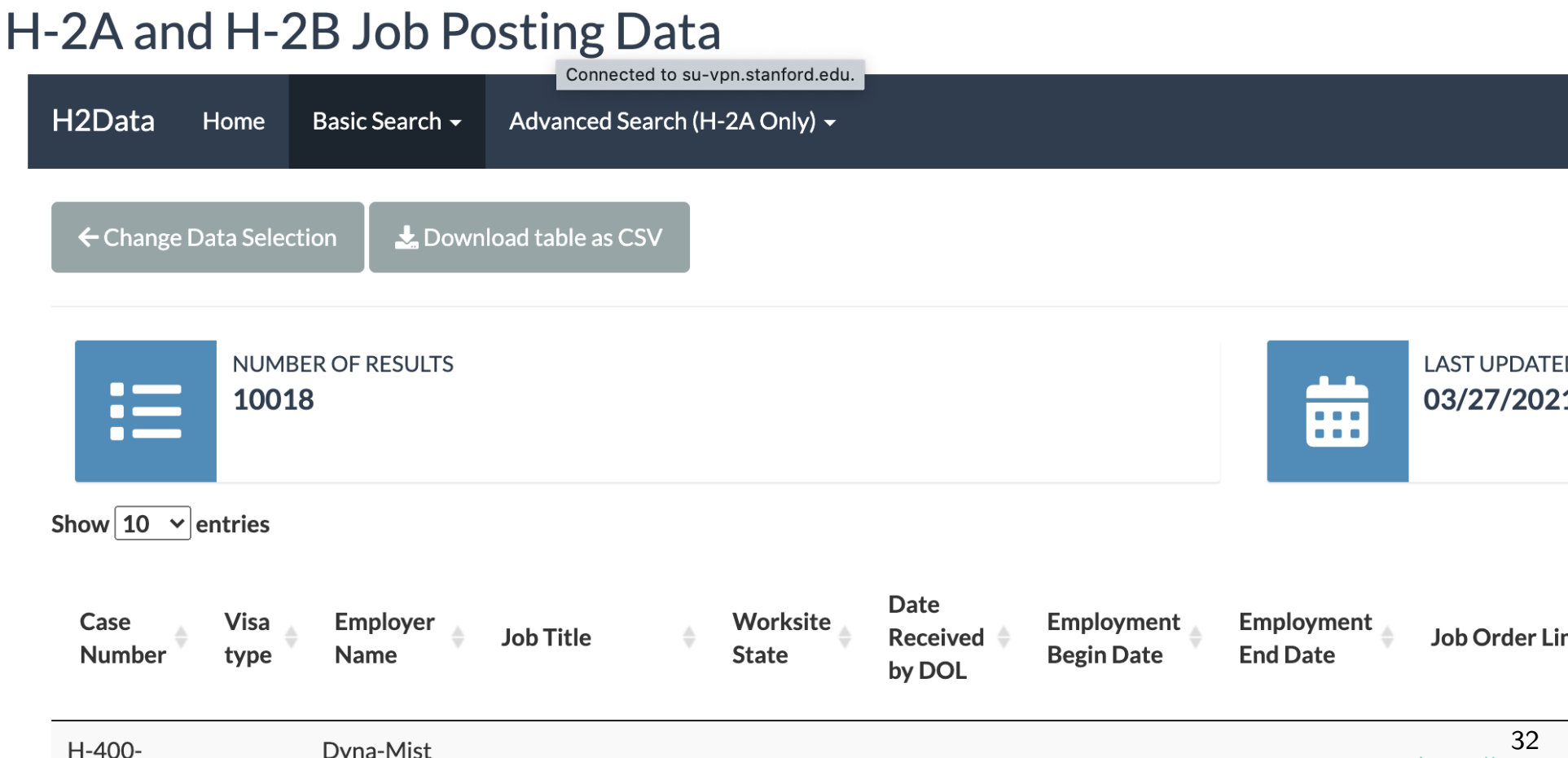
Social impact practicum: protecting the legal rights of temporary guestworkers

- Will learn much more from our visitors over the next couple weeks!
- **Broadly:**
  - US Department of Labor (DOL) gives what are called H-2 visas to authorized employers
  - Employers then hire foreign workers for these temporary visas; provide housing/transportation but the worker's visa is tied to that employer
  - If not well monitored, potential for violations of employee's rights (e.g., not paying them wages their due; overwork; unsafe conditions), since employee has choice must either tolerate the conditions, remain in the country but become undocumented, leave, or face deportation

What TRLA data scientists have done thus far

https://trla.shinyapps.io/H2Data/

Scraper to pull daily job postings data on places employing H-2 guestworkers



Used to hire carnival workers...

But darker side

Broad project goal