ENVIRONMENTAL DATA ANALYTICS

ENV 872L

Spring 2020

Duke

NICHOLAS SCHOOL OF THE
ENVIRONMENT

WELCOME TO ENVIRONMENTAL DATA ANALYTICS

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WELCOME TO ENVIRONMENTAL DATA ANALYTICS

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2nd year MEM, Energy & Environment

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Office hours: TBD

WELCOME TO ENVIRONMENTAL DATA ANALYTICS

29 students
- 7 – Water Resources Management
- 6 – Coastal Environmental Management
- 6 – Environmental Science & Conservation
- 4 – International Development & Policy
- 3 – Environmental Economics & Policy
- 2 – Ecotoxicology & Environmental Health
- 2 – Energy & Environment
- 1 – Business & Environment
- 1 – PhD

What types of data are common in your field?

DATA PRACTICES ARE IN DEMAND

- Software skills are necessary prerequisites for employment
- Reproducible data pipelines are efficient and consistent → increased productivity
- Troubleshooting skills increase the capacity for independence
- Effective reporting → clear and efficient communication of outcomes/findings

COURSE OBJECTIVES

1. Gain proficiency in the language and application of R software

2. Synthesize information from datasets, working from start to finish in the "data pipeline"

3. Develop skills to identify and apply appropriate statistical and graphical approaches for environmental datasets

4. Integrate multiple technological applications involved in contemporary data analysis, workflow, and management
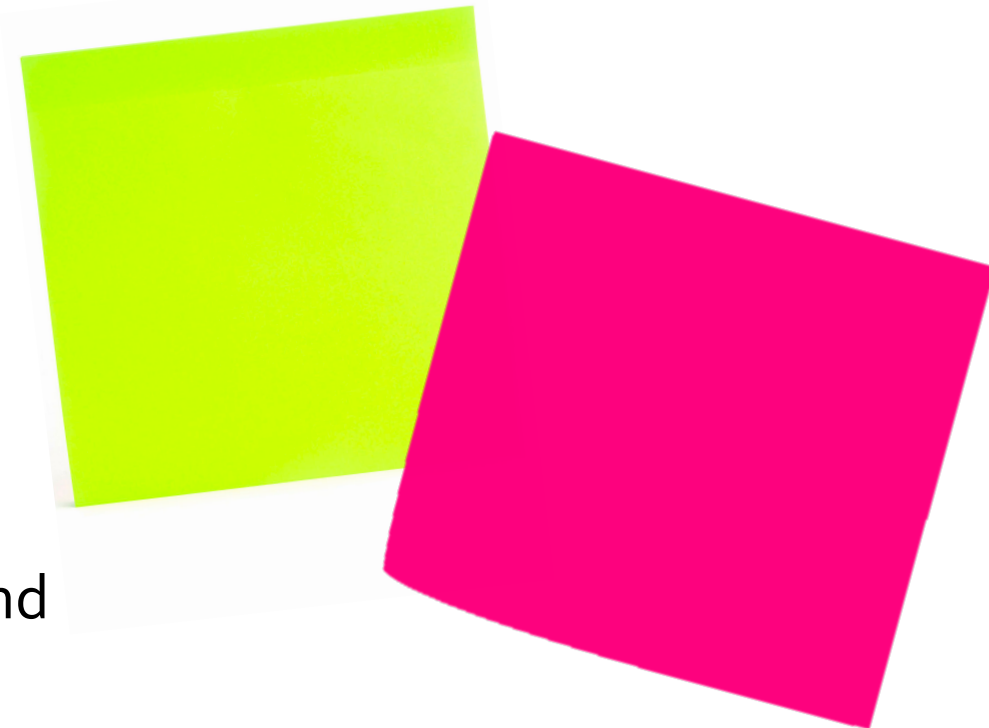
TECHNICAL LOGISTICS

Computers
- Option 1: Lab computer, mapped to CIFS server
- Option 2: Personal computer, download all necessary software
- Software installation guide provided

During class
- Green sticky note:
  - I am keeping up
  - I am ready to move on
- Pink sticky note:
  - I am stuck
  - my task is still in progress
- 1 % bonus if you keep your stickies until the end

COURSE LOGISTICS

- Course materials in Github repository
    - Pull updates each class
    - Save your own progress inside files
- Helpful tools
    - R for Data Science
    - Stack Overflow
    - Google
- Assignments submitted to Sakai

INQUIRY-BASED LEARNING

Construction of knowledge through scientific practices

Involves:

- Problem solving skills
- Active participation
- Knowledge discovery by the learner
- Inductive and/or deductive approach

Outcomes: inquiry based learning > traditional instruction

Engage

The purpose of the ENGAGE stage is to pique student interest and get them personally involved in the lesson, while preassessing prior knowledge.

1

Explore

The purpose of the EXPLORE stage is to get students involved in the topic; providing them with a chance to build their own understanding.

2

Explain

The purpose for the EXPLAIN stage is to provide students with an opportunity to communicate what they have learned so far and figure out what it means.

3

Extend

The purpose for the EXTEND stage is to allow students to use their new knowledge and continue to explore its implications.

4

Evaluate

The purpose for the EVALUATION stage is for both students and teachers to determine how much learning and understanding has taken place.

5

EXPECTATIONS

- Software up to date (outside class)
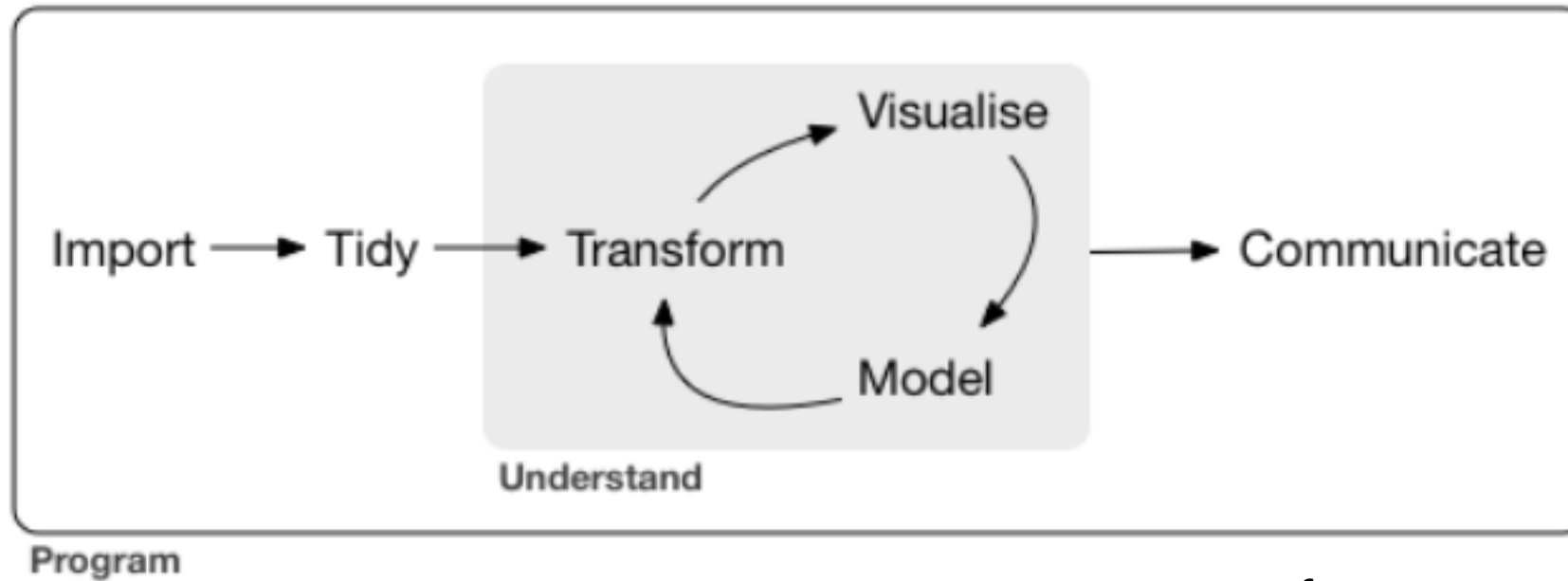- Troubleshooting
- Missing class
- Cooperative learning

GRADING

Assignments 75 %

- 11 assignments, 1 per unit
- Evaluated for completion, application of concepts/code, discussion

Project 25 %

- Choose example dataset and research question
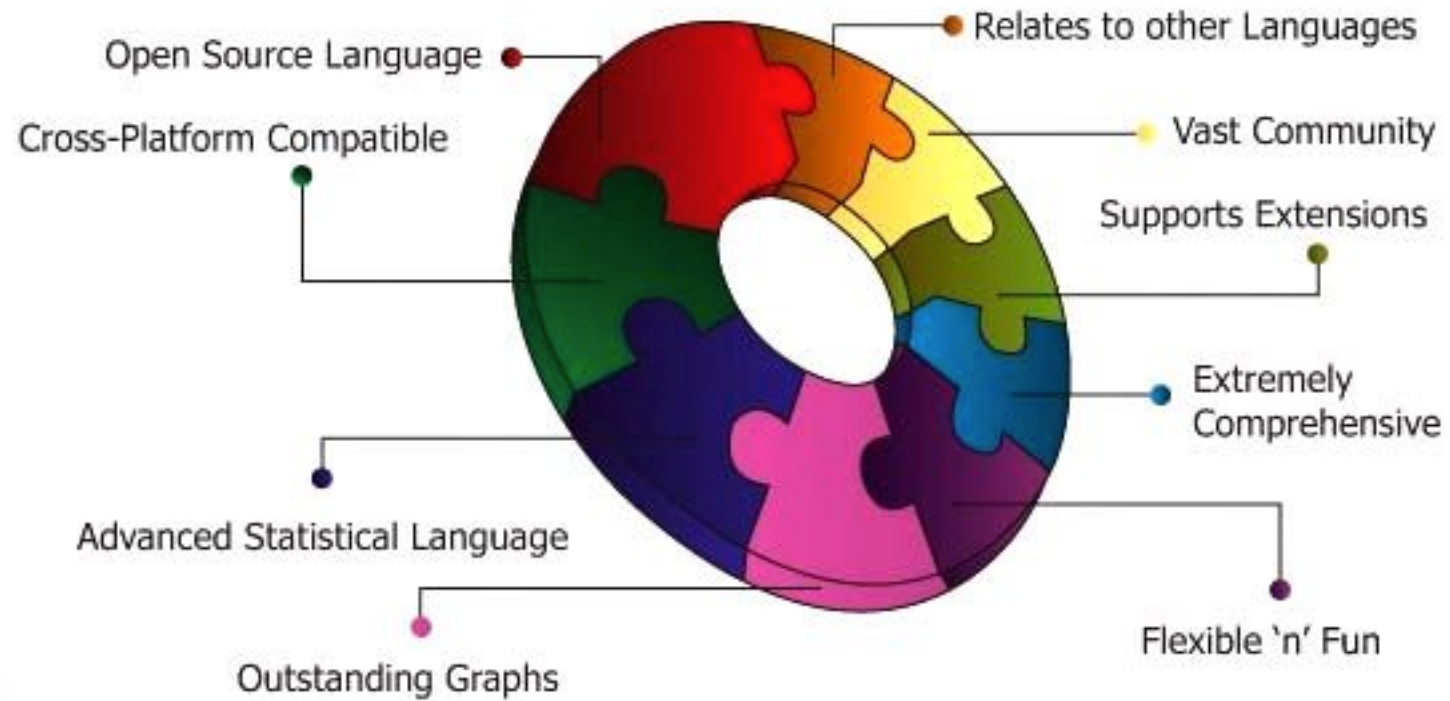- Run through data workflow
- Report

THE DATA SCIENCE PIPELINE
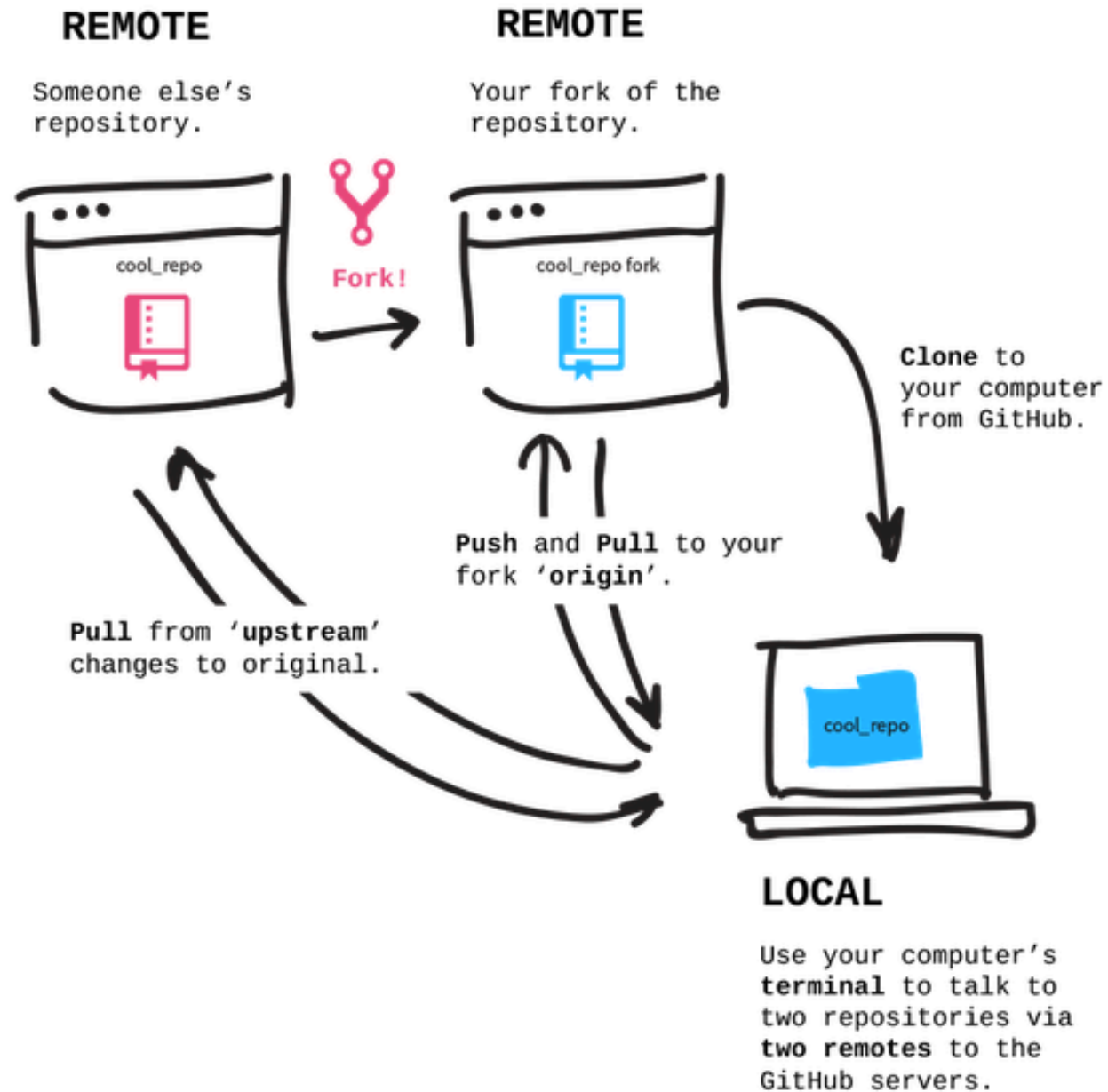

From: R for Data Science

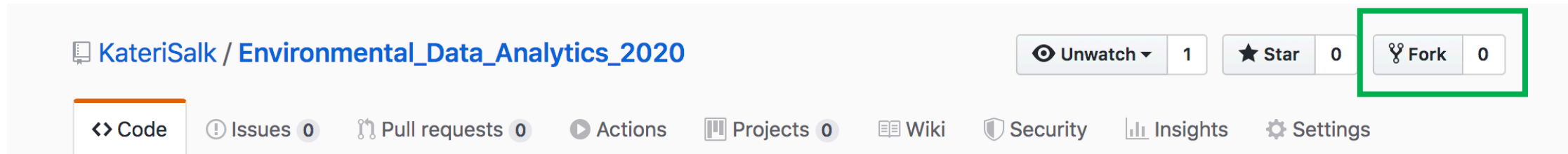Which components of data science have you practiced before?

WHY R?

Open Source Language
Cross-Platform Compatible
Advanced Statistical Language
Outstanding Graphs
Relates to other Languages
Vast Community
Supports Extensions
Extremely Comprehensive
Flexible 'n' Fun

imarticus.org

GITHUB SETUP

REMOTE

Someone else's repository.

cool_repo

Fork!

REMOTE

Your fork of the repository.

cool_repo fork

Clone to your computer from GitHub.

Push and **Pull** to your fork '**origin**'.

Pull from '**upstream**' changes to original.

cool_repo

LOCAL

Use your computer's **terminal** to talk to two repositories via **two remotes** to the GitHub servers.

GITHUB SETUP: FORKING

1. Navigate to https://github.com/KateriSalk/Environmental_Data_Analytics_2020

2. Fork the repository to your GitHub account

GITHUB SETUP: CLONING

3. Copy the link to your forked repository

GITHUB SETUP: CLONING

4. Open RStudio and go to File > New Project...

5. Select "Version Control", then "Git"

6. Paste your forked repo URL and choose a folder where the local repo will be saved
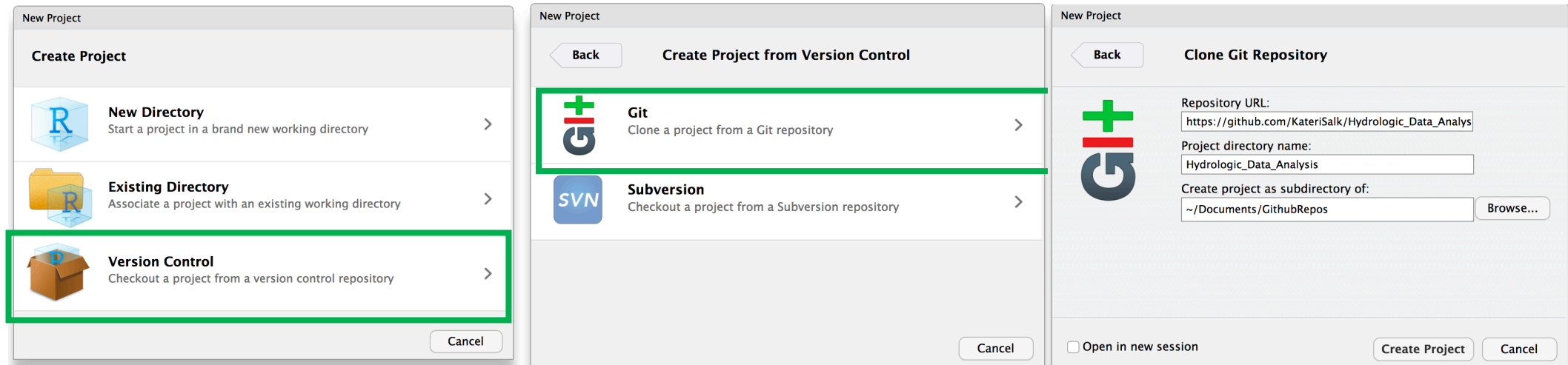
GITHUB SETUP: COMMIT AND PUSH

Open the Git_Help file and follow the instructions in the Editing, Committing, Pushing section.

1. Navigate to the "README.md" file in the Files tab and open it.

2. Type your name after "Student:" and save.

3. Now that you have edited a file, it should now appear in the Git tab. Click the box to the left of the file, where a check mark should now appear.

4. Press the "Commit" button. A new window should appear that shows the changes that have been made to the file.

5. Write a message detailing the edits you've made to the README file. You should always include a commit message to your commits so that your future self and/or your collaborators will know what changes were made. Click "Commit".

6. Click the green upward facing arrow: the "Push" button. Your remote repository is now up to date with your local repository.

GITHUB SETUP: ADD AND PULL FROM THE REMOTE

Follow the instructions in the "Pulling from the upstream remote" section of the Git_Help file:

1. In the Terminal tab, type: git remote add upstream https://github.com/KateriSalk/Environmental_Data_Analytics_2020

2. In the Terminal tab, type: git pull upstream master