

HYDROLOGIC DATA ANALYSIS

Hydrologic Data Analysis
Fall 2019



WELCOME TO HYDROLOGIC DATA ANALYSIS

Kateri Salk, PhD

Visiting Assistant Professor of Water Resources

kateri.salk@duke.edu

Grainger Hall 3115



Background:

- Limnology, biogeochemistry
- Environmental informatics
- Empirical and process-based modeling

WELCOME TO HYDROLOGIC DATA ANALYSIS

Cathy Chamberlin

PhD Student

University Program in Ecology

catherine.chamberlin@duke.edu

Grainger Hall 3120

Background:

- Biogeochemistry, chemistry, molecular biology
- Rivers
- High frequency environmental data analysis

OFFICE HOURS

We will set office hours based on student schedules. Fill out the poll!

<https://www.when2meet.com/?8002020-pRpzX>

COURSE ACCESS

kits.duke.edu

- Sakai
- GitHub
- CIFS server space
- More to come...

≡ DukeKits

2019 FALL ▾

CROSSLISTED COURSE F19

Hydrologic Data Analysis (Lecture)



Sakai



CIFS
Server
Space



GitHub
Repository



ADD
APP

COURSE OBJECTIVES

1. Synthesize information on fundamental and applied topics in water resources using quantitative analysis
2. Apply the appropriate steps of the data analytics pipeline to answer questions about aquatic systems
3. Develop oral, visual, and written skills for communicating findings and connecting topics to societal issues

COURSE SCHEDULE

Week 1: Intro and R boot camp

Weeks 2-3: Physical properties of lakes & rivers

Weeks 4-5: Water quality in lakes & rivers

Weeks 6-8: Time series analysis, high frequency data, mapping

Each week will have an assignment (homework) (60 % of grade)

COURSE SCHEDULE

Weeks 9-13: Course project

- Teams chosen early in the course
- Teams will choose research topic and dataset
- Components:
 - Initial proposal and plan (5 %)
 - Brainstorming sessions (5 %)
 - Report draft (5 %)
 - Final report (15 %)
 - Final presentation (10 %)

OTHER SYLLABUS STUFF

- Schedule specifics
- Accommodations
- Emergency procedures
- Use the campus resources!

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

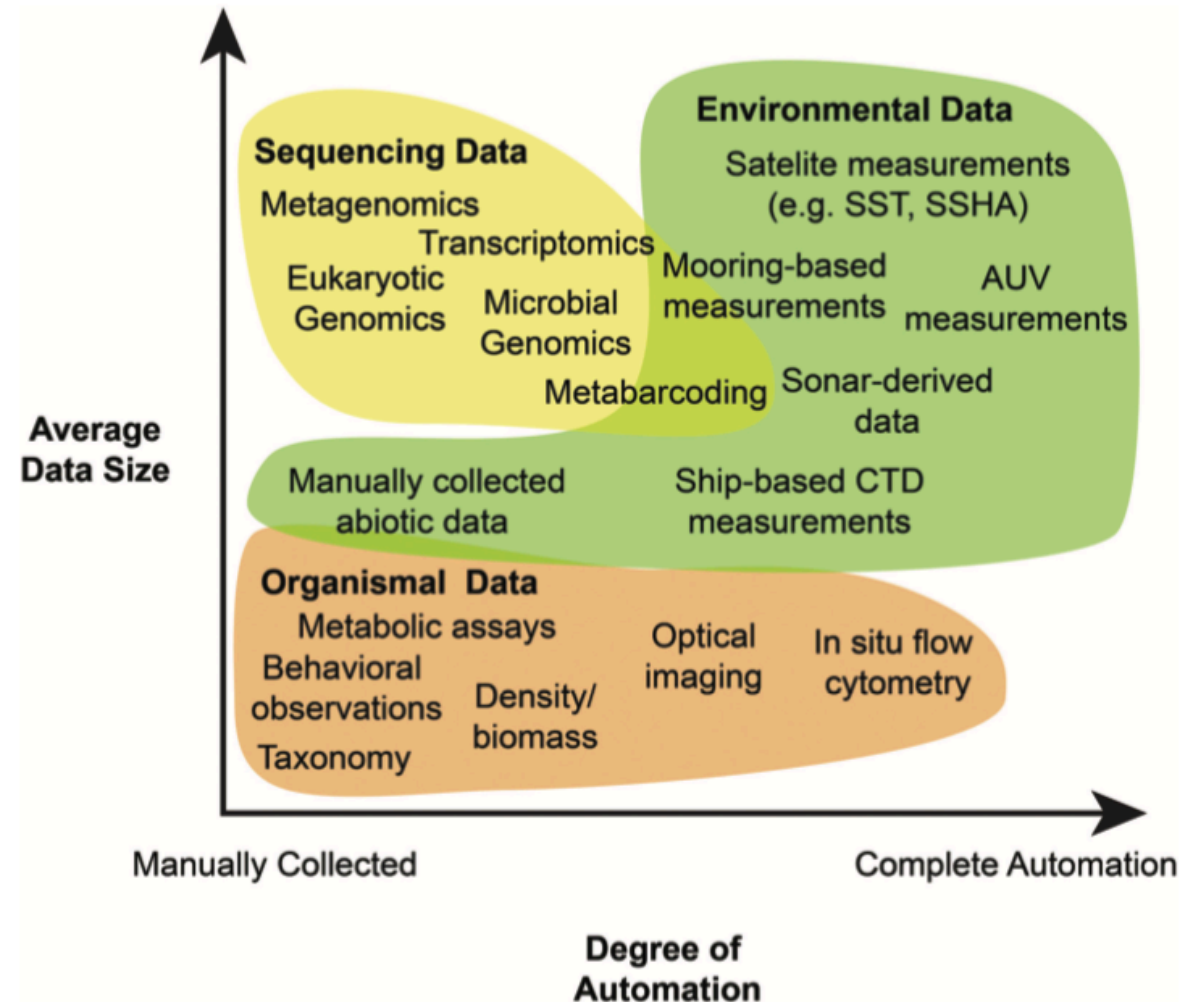
- Yellow sticky note: I am behind
- Orange sticky note: I am stuck



INTEGRATING BIG DATA INTO AQUATIC ECOLOGY

Durden et al. 2017

- What are the big ideas of this paper?
- Examples of big data in your field → how do these examples relate to the ideas presented in the paper?
- Unique opportunities and challenges related to big data in the aquatic sciences? Which of these do you see as most important or distinctive?



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

INQUIRY-BASED LEARNING

Research questions:

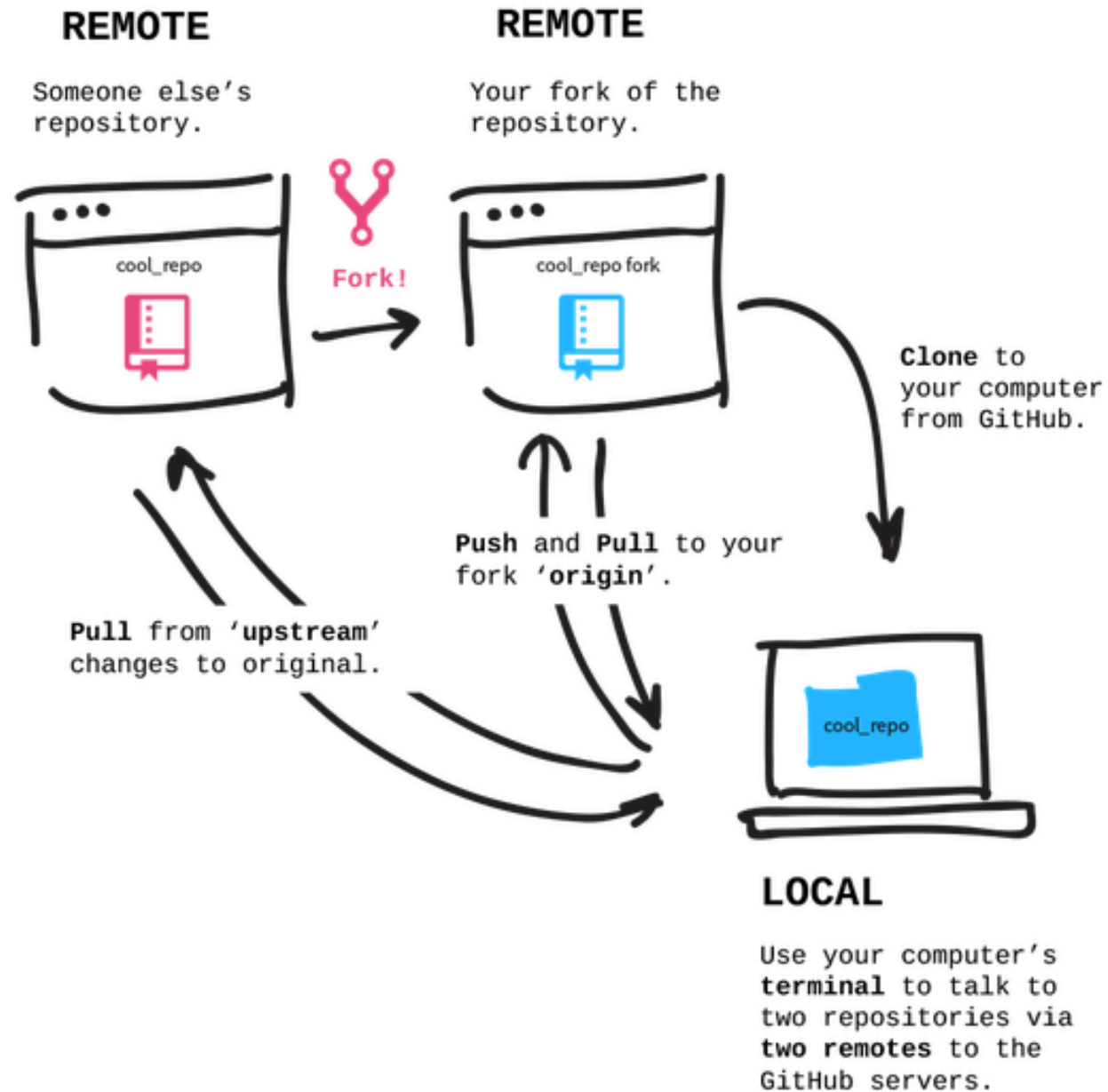
1. How does an inquiry-based approach impact student learning of a) fundamental processes in aquatic systems and b) skills in data analytics?
2. How is big data changing the way we analyze and interpret aquatic systems?

Opt in to participating in this research study (consent form in Sakai)

GATHERING DATA ON OUR CLASS

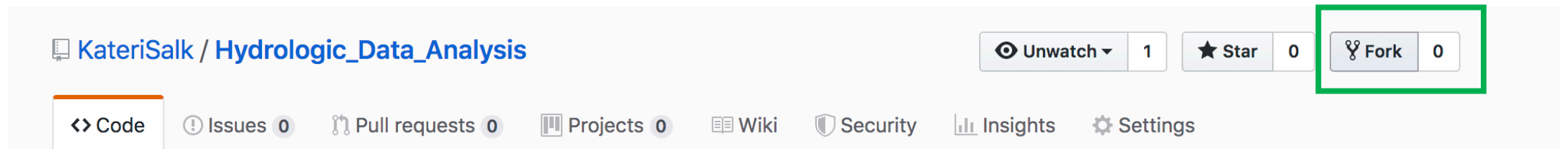
- Take 1 post-it of each color and write your name on each
- How would you rate your knowledge or skills in the following topics?
 - Place the post-it on the number corresponding to your answer
 - If 2+ people choose the same number, stack post-its on each other
- In addition, add a star to the post-it corresponding to the topic you would most like to improve during this course.

GITHUB SETUP



GITHUB SETUP: FORKING

1. Navigate to [https://github.com/KateriSalk/Hydrologic Data Analysis](https://github.com/KateriSalk/Hydrologic_Data_Analysis)
2. Fork the repository to your GitHub account



GITHUB SETUP: CLONING

3. Copy the link to your forked repository

The screenshot shows the GitHub interface for the repository 'KateriSalk / Hydrologic_Data_Analysis'. The repository has 1 commit, 1 branch, 0 releases, 1 contributor, and is licensed under GPL-3.0. The 'Clone or download' button is highlighted, and the dropdown menu is open, showing the 'Clone with HTTPS' option selected. The URL 'https://github.com/KateriSalk/Hydrologic_Data_Analysis' is displayed in the input field, and the 'Open in Desktop' button is highlighted.

KateriSalk / Hydrologic_Data_Analysis

Unwatch 1 Star 0 Fork 0

Code Issues 0 Pull requests 0 Projects 0 Wiki Security Insights Settings

Duke University course: Hydrologic Data Analysis (Fall 2019) Edit

Manage topics

1 commit 1 branch 0 releases 1 contributor GPL-3.0

Branch: master New pull request Create new file Upload files Find File Clone or download

KateriSalk Initial commit

.gitignore	Initial commit
LICENSE	Initial commit
README.md	Initial commit

Clone with HTTPS Use SSH

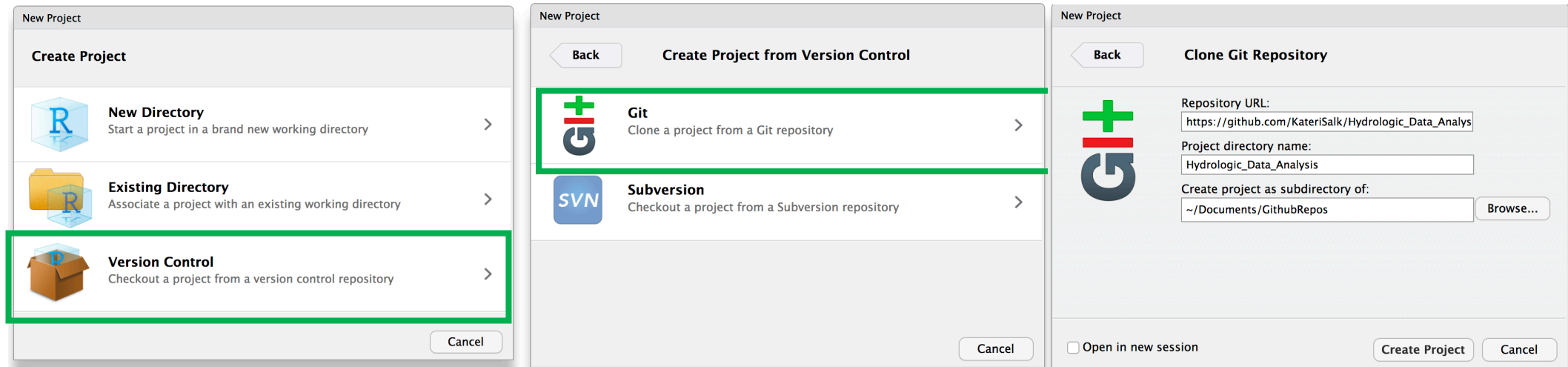
Use Git or checkout with SVN using the web URL.

https://github.com/KateriSalk/Hydrologic_Data_Analysis

Open in Desktop Download ZIP

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.
- Familiarize yourself with how to keep the local, remote, and upstream remote repositories up to date with each other.
- Help others if you are finished!