Talking in Code: Code Review as a Form of Communication

Lisinker, R., Zieffler, A., Legacy, C.

Students who engaged in code review reported communication and increased focus on documentation as learning outcomes.

Background

Code Review (CR) is defined as a manual and systematic line-by-line code inspection. Typically conducted by peers, the process is also referred to as Peer Code Review (PCR). Some software exists to aid with code review; however, this project focuses on manual inspection. Code review is conducted to improve code quality, ensure code adheres to project guidelines, and find bugs.

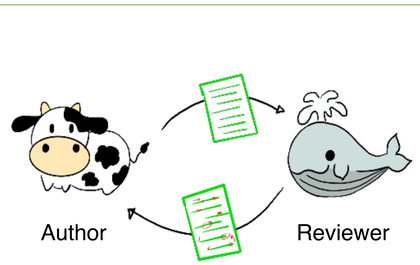
Benefits:

- Communication
- Consistent feedback loop
- Knowledge sharing
- Cleaner code

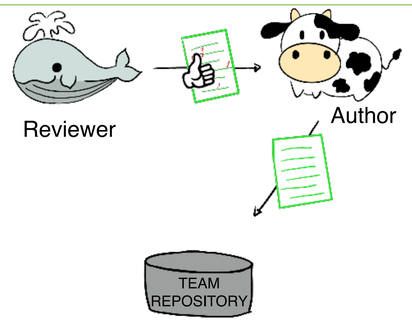
Challenges:

- Timing
- Establishing CR process
- Scope and tone of feedback

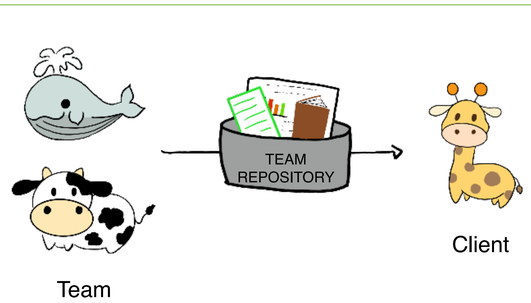
The Data Science Corps-WAV (Wrangle, Analyze, Visualize) project is an experiential learning opportunity for Data Science undergraduates. Student teams are given the opportunity to work with local community organizations to provide data science deliverables



Code is written by designated author and code review feedback loop between author and reviewer is initiated



Reviewer gives the OK on final review round and code is added to the team's repository

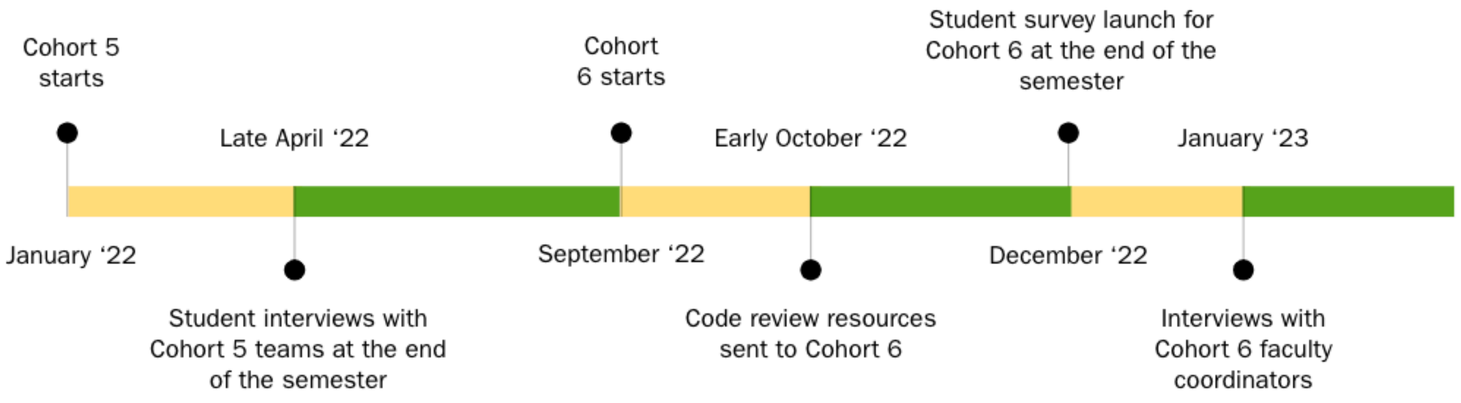


The team provides the completed project along with code and documentation to client for review

Methods

The F22 cohort received CR resources which consisted of action items, style guide considerations, a code review checklist, and a video example of how to use the checklist. A student survey and interview protocol for faculty coordinators were created to answer the following questions:

1. How do students implement peer code review before and after using the code review checklist?
2. How easy/useful was it to use the checklist?
3. Did usage of the checklist aid students' data science skill development and/or impact the project in any way?



Cartoon animals traced from: hand draw PNG Designed By 58pic from https://pngtree.com/freepng/hand-drawn-blackboard-cartoon-animals_7227703.html?sol=downref&id=bef

Results

Baseline interviews with S22 cohort confirmed that students rarely conducted code review on their own and primarily treated CR as a bug-detecting activity. Faculty involvement provided structure; however, the teams did not establish team norms at the onset of their projects.

"Mostly learned about non-technical aspects of data science like communication to get data we need and making sure we're being ethical in our work."
"I mainly gained collaboration skills and witnessed the start-to-end process of a real-world data science project"
"We considered aspects of our coding such as commenting or naming variables that needed consistency throughout the analysis so it would be easier to interpret for [the client]"
"How to communicate with the team about availability"

Team 1:

- Utilized CR resources
- Hands-on faculty coordinator who promoted CR resources
- Focus on documentation of codebase

Team 2:

- Did not utilize CR resources
- Student-facing faculty coordinator acted as client
- Logistical issues at start of semester

Individual interviews conducted with the designated faculty advisors for each team provided more detail and corroborated student survey responses. Advisors commented on student growth and reflected on group habits throughout the semester.

Conclusions and Future Work

- The student team that engaged in code review (Team 1) reported improved communication and increased focus on documentation. This growth was echoed by their faculty coordinator.
- Faculty involvement and encouragement was a strong predictor of whether students implemented code review within their projects, before and after code review resources were provided.
- Future work may look at:
  - Video evidence of how students utilize code review resources
  - Code quality as a result of different levels of code review
  - Data visualization as a form of communication and the stories created and told through graphics

NSF Award Abstract # 1923700

UNIVERSITY OF MINNESOTA
Driven to Discover®