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Experiences on teaching version control

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Introduction - Why Version Control in statistics education?

- Many degree programmes in Statistics consist of courses with a high volume of theory, lacking exposure to technical skills key for the workplace.
- It is important that we equip our graduates with such skills, so they are prepared for the job market.
- Version control is becoming an ever-increasing feature within roles across academia and industry in statistics and data science.
- How do we integrate teaching version control into our learning and teaching practice?



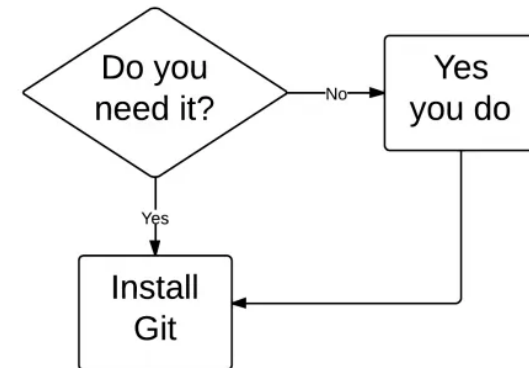


Your views on version control

- Are you currently using version control in your practice?



Version Control Flowchart



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Introduction – Incorporating Version Control into Teaching

- To help integrate version control knowledge into our teaching practices, we have:
- Created a short Version Control course
 - Developed by David McArthur, Andrew Elliott, Craig Alexander & Vinny Davies.
 - Designed for use for UG/PG students, PG researchers & staff.
- Designed assessment strategies using Version Control
 - Promoting use within group-based assessments.
 - Incorporating short course notes, promoting a flipped classroom strategy.



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Incorporating version control

- In what ways have you incorporated version control in your practice?



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Developing a Version Control Course – Case Study

- An ‘Innovation in Teaching’ project to develop short course on version control as part of the school’s AI3 Initiative².
- Comprised of seven units building from basics to advanced concepts.
- Tailored exercises which can be used for stand-alone learning or as part of a course.
- Course notes use bespoke accessible features as discussed in Jack et al. (2023)³.



2. <https://www.gla.ac.uk/schools/mathematicsstatistics/research/stats/teaching/versioncontrolforteachingandresearch/>

3. Jack, E., Alexander, C., McArthur, D. and Mair, C. (2023) Reflections on designing and delivering an online distance learning programme in the mathematical sciences. *MSOR Connections*, 21(2), pp. 25-33. (doi: [10.21100/msor.v21i2.1397](https://doi.org/10.21100/msor.v21i2.1397))



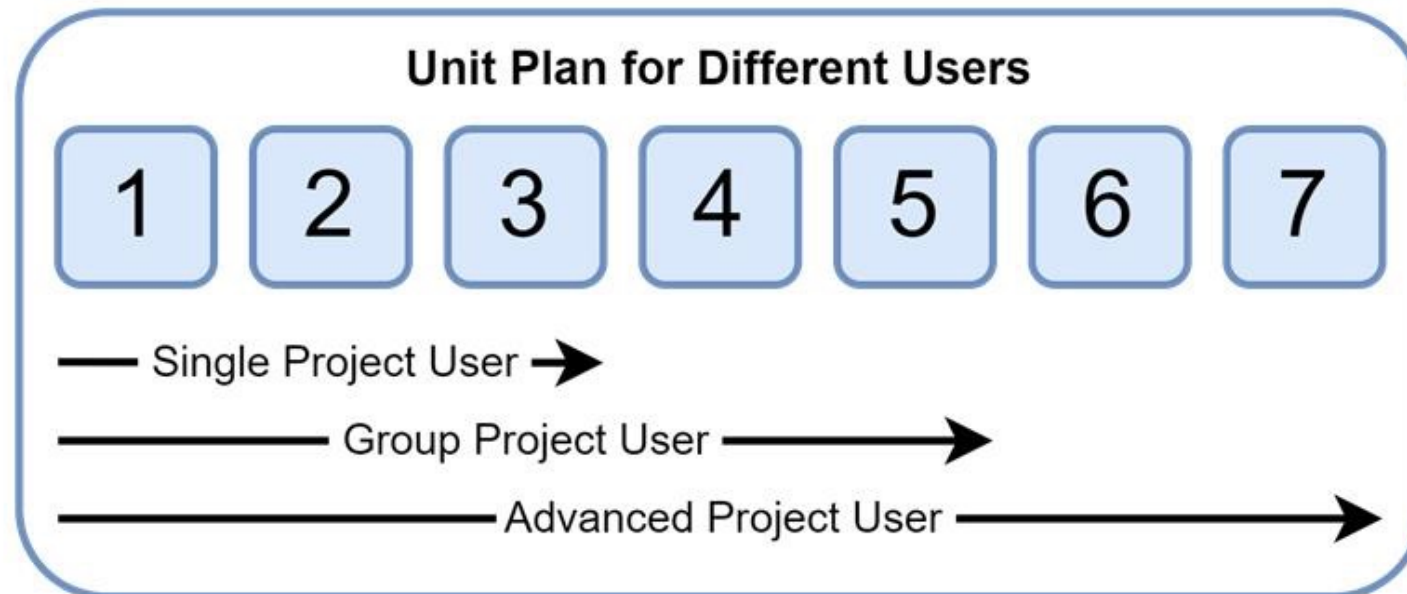
Developing a version control course – Considerations

- When designing the course, several considerations had to be made.
- There are an abundance of online resources for using version control – aim is to create a tailored course that is accessible to a host of users.
- Users have different areas of expertise – need a course which covers multiple usage scenarios.
 - For example, UG students and PG researchers will have different levels of exposure to programming and project-based work – course content & structure should reflect this.



Considerations – Example Structure

- Learners will all have different desired outcomes in terms of what they would like to get out of the course.
- Course has been designed in structured units to meet the needs for each users' requirements.





Developing a Version Control Course – Course Structure

- Unit 1 – Up and Running
- Unit 2 – Basic workflow for single user
- Unit 3 – Consuming & contributing to open-source projects
- Unit 4 – Solid foundations for users
- Unit 5 – Branching and branching strategies
- Unit 6 – Using GitHub Flow in a team
- Unit 7 – Foundations for advanced users



Considerations – Command line vs. GitHub Desktop

- Git commands can be carried out using command line operations or via a GUI such as GitHub Desktop.
- To cater to the different needs of users, the notes include examples for both command line and GitHub Desktop use.
- We have provided details on using either format for the full course, providing a “switcher” within the notes to allow users to choose their preference.

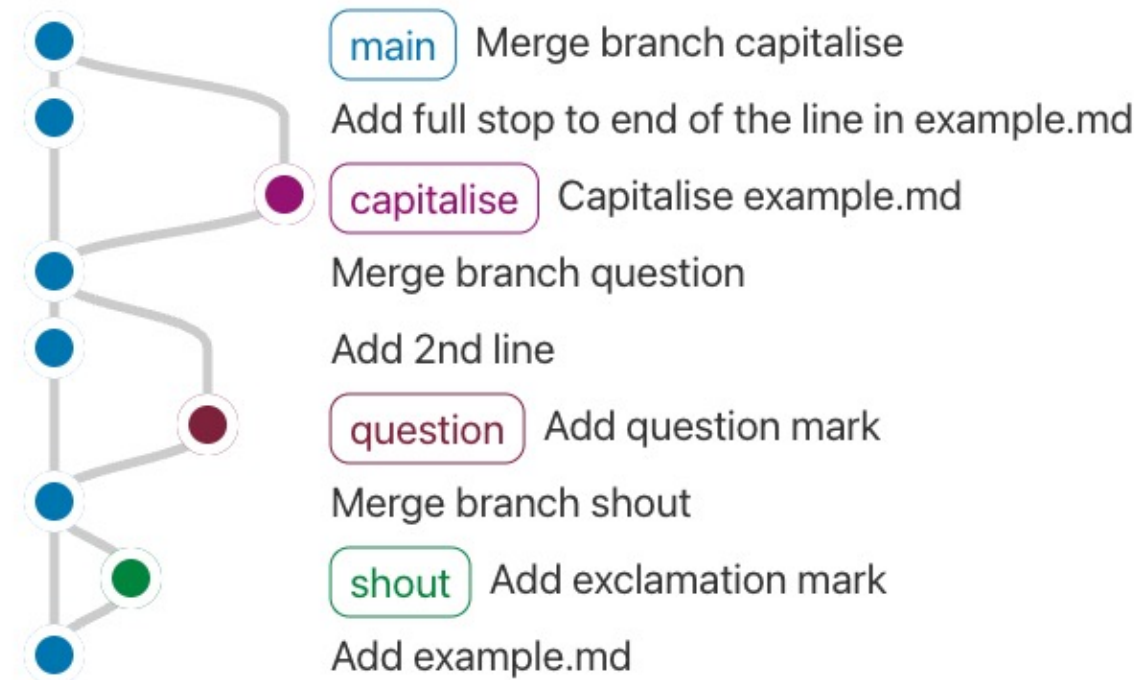
Command-line | GitHub Desktop

We can stage the file using the `add` command:

```
> git add poem.txt
```

Considerations – Visualising Branches

- To illustrate the concepts behind git and GitHub, we have included a graphical visualisation of a repository using gitgraph⁴.
- This allows us to give a graphical representation of a repository workflow and are particularly useful when discussing branching.





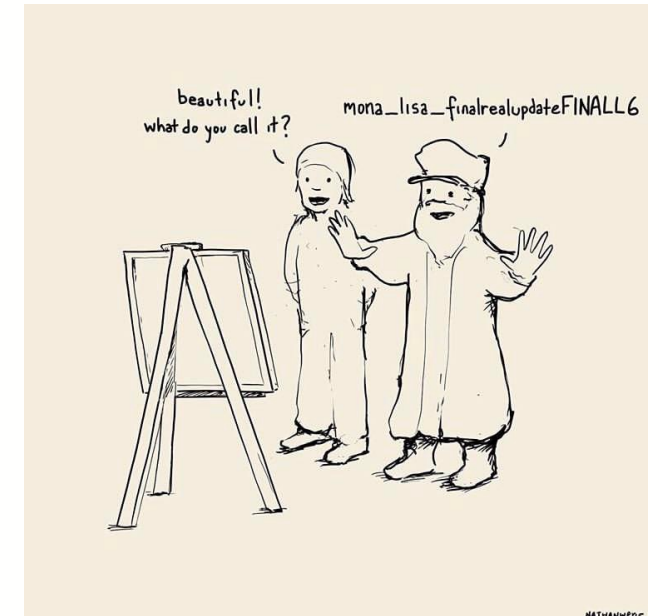
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Implementing Version Control in Courses

- Within the curriculum at your institution, which courses do you feel would be best place to teach version control?



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Implementing Version Control in Courses

- This academic year, the course has been shared as a resource to all staff and students, and implemented in the following courses:
 - Semester 2 MSc (on-campus) course on Data Analysis Skills
 - Semester 2 UG course on Data Analysis
 - ODL MSc final project students
 - Staff/PhD students – 1.5h presentation and course release



Feedback on Version Control Course

- Early feedback on the course has been positive, though there are some differences between the learning cohorts:
 - Students primarily focus on the first 5 units. They would like more examples and video tutorials included in the materials.
 - PhD students and staff focussed mainly on all units. They found the materials easier to follow than taught students and have a generally positive view of version control.
- Taught students did highlight the importance of knowing version control from a career perspective, but did highlight they would like more exposure to version control on the programme.



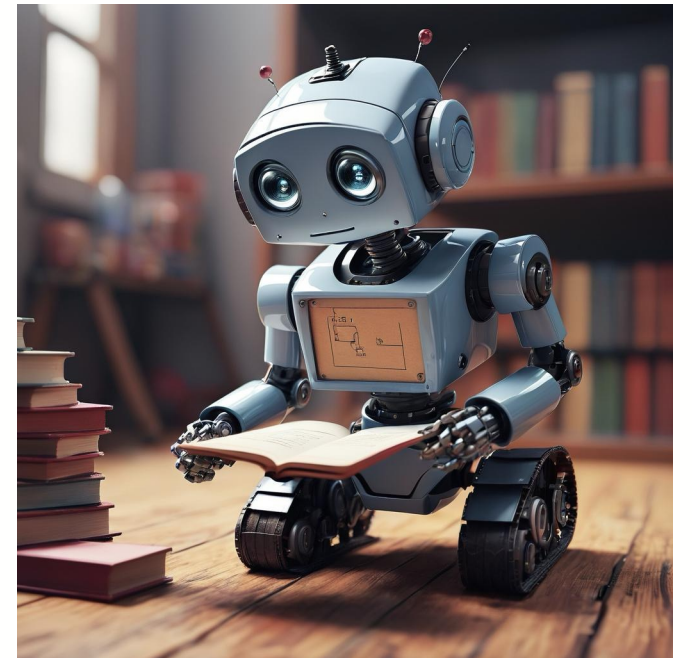
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Incorporating version control in assessment

- In terms of assessment, what assessments do you currently offer that could incorporate version control?



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Using Version Control in Assessment – Case Study

- Semester 2 MSc Data Analysis Skills course – focus on graduate attributes for careers in statistics and data science.
- Version control covered for 2 weeks of the course, using short course delivered in a flipped classroom format.
- Group project using version control for data analysis
 - Groups create repository for R analysis
 - Promoting working in a collaborative environment
 - Assessment focus on general good practice, successful use of pull requests and code review.



Using Version Control in Assessment – Case Study

- Student feedback very positive on using version control.
- Enjoy practical exposure to group-based projects.
- For next year:
 - Potential extension to use GitHub Classroom⁵ to assist with administrative processes and assess version control use more.

GitHub Classroom

Your course assignments on GitHub





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Thank you for listening!

If you have any questions, feel free to contact me at:
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Slides available at:

[https://github.com/craigalexander/Presentations/blob/main/
UKCOTS_24_Craig_Alexander.pdf](https://github.com/craigalexander/Presentations/blob/main/UKCOTS_24_Craig_Alexander.pdf)

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