MachineLearnAthon - Microlecture Introduction to Git

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MachineLearnAthon
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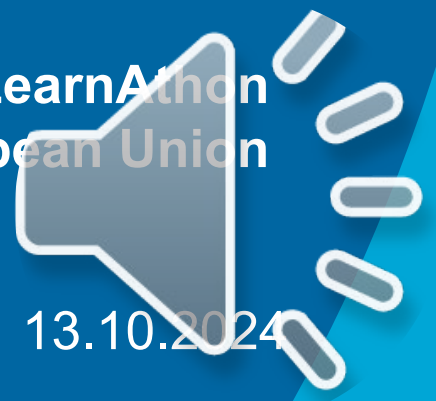


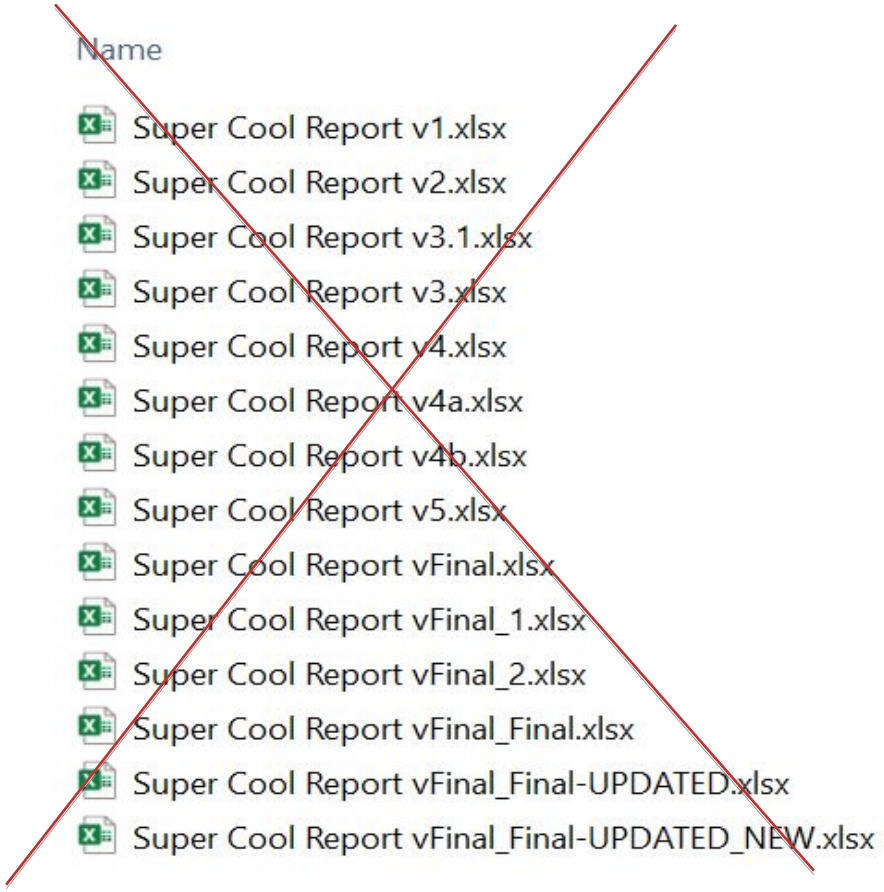
13.10.2024

Agenda today

- What is version control and why we need it
- Introduction to Git
- Key commands
- GitHub and Google Colab

Why we need version control?

Example of saving many files without version control



Not this way!

- **Unsustainable:** Manually saving versions quickly becomes messy.
- **Not Scalable:** Difficult to manage as the project grows.
- **No Change Tracking:** Impossible to see who made what changes or when.
- **Error-Prone:** High risk of overwriting or losing important work.
- **Collaboration Issues:** Hard for multiple people to work on the same project.

source: https://www.reddit.com/r/ProgrammerHumor/comments/oz4pfb/version_controlcan_anyone_relate/#lightbox

What is Version Control

Definition: System to track changes in code or documents over time, allowing collaboration and management of multiple versions.

Key Benefits:

- Collaboration: Multiple developers can work on the same project simultaneously.
- History Tracking: Keeps a record of all changes, who made them, and when.
- Branching: Supports parallel development by creating separate branches for new features/bug fixes.
- Merging: Combines changes from different branches into one.
- Reversion: Easily revert to a previous version if errors are introduced.

Introduction to GIT

A **distributed version control** system for software projects

- Introduced in 2005 by Linus Torvalds
- Essential tool for modern developers
- Integrated into major IDEs such as VS Code or PyCharm

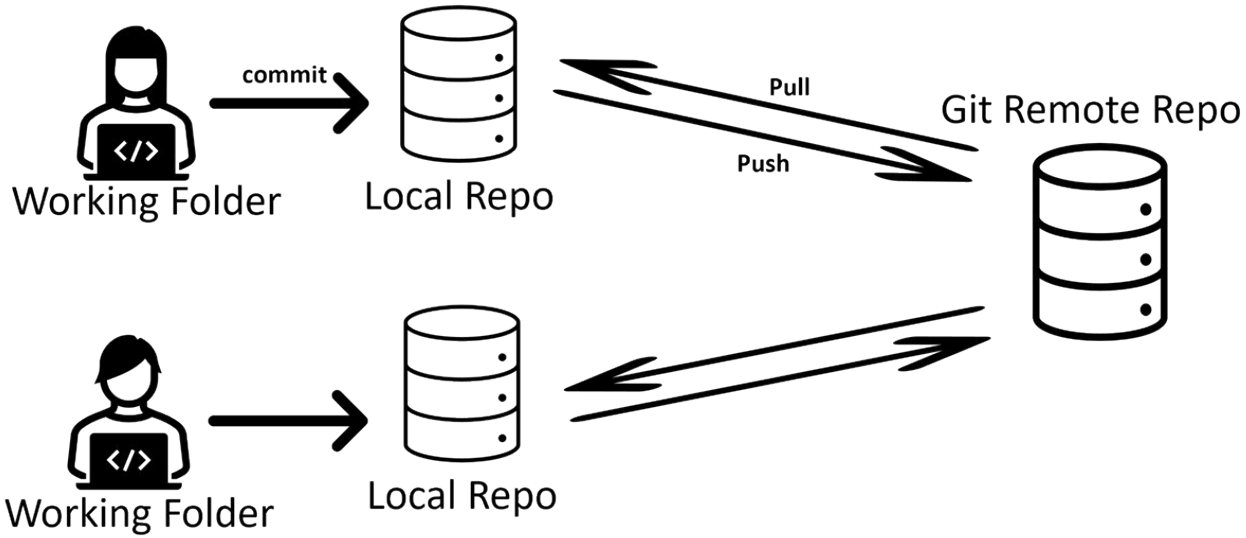
Key concepts

- **Repositories:** Central location to store project files and their history
- **Commands:** Used to commit changes, manage versions, and collaborate with others
- **Branches and Merging**: Enable parallel work on different versions of the codebase and combine changes when ready

Repositories - local and remote

Repository: is a collection of files and folders that Git tracks to monitor changes and versions over time.

Git uses repositories to manage version history for project files.



source: https://se.mathworks.com/help/matlab/matlab_prog/source_control_git.png

- **Remote Repository:** A version of the project stored on a server (e.g., GitHub, GitLab).‘
- **Local Repository:** A copy of the project saved on your computer.

Key Git commands

- *git clone* – Clone a remote repository to a local folder
- *git commit* – Send changes to the local repository
- *git push* – Send changes to a remote repository
- *git status* – Check the current branch's status (e.g., changes, staged files)
- *git checkout* – Switch branches or restore files
- *git fetch* – Fetch updates from the remote repository (e.g., new branches or commits)
- *git pull* – Fetch and integrate (pull) changes from a remote branch into your current branch

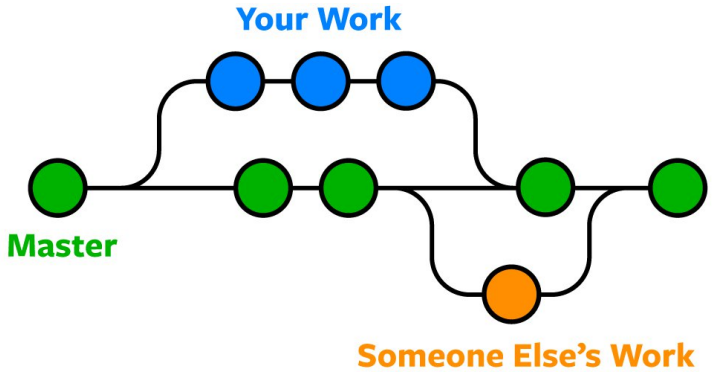
Branches and merging

In order to better organize flow of the work, we are usually using different branches

Main/master – the most important branch, keeping the recent production version of the project. Cannot be deleted

Project branches – created for implementing new functionality, modification or fix.

- New code is firstly developed in here, and only once tested and approved it is merged to **main/master**



https://www.nobledesktop.com/learn/git/git-branches

Examples:

- *new-function*
- *fix-bug*

Pull Request

- Key part of the review process
- Before merging to master we need to open PR
  - usually required 2-3 approvals, by different person
  - assure code quality check
  - only once fully approved, changes might be merged to master

GitHub

- Remote server for storing of Git project and repositories
- Most popular platform nowadays

- However, there are alternatives
  - GitLab
  - BitBucket

source: https://github.blog/wp-content/uploads/2024/07/github-logo.png

Google Colab and Git

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