Lab 1: Introductory computing

This lab covers the basics of version control using git and github, R, and bash

Git, Github, and Branching

Taking notes from free code camp git and Github for beginners
https://www.youtube.com/watch?v=RGOj5yH7evk

- ▼ What is git?
  - ▼ Git is a free and open version control system
- ▼ What is version control?
  - ▼ management of changes to documents, computer programs, large websites and other collections of information.
  - ▼ It allows us to figure out what we did when and track bugs
- ▼ What is Github and how is it different from git?
  - ▼ Github is a website where you can host your repositories
  - ▼ git is the tool that tracks changes in your code overtime
- ▼ What cli command can you use to check if you have git installed on your machine?
  - ▼ git —version
- ▼ How can you pull a remote github repository to your local folder using the command line?
  - ▼ git clone repo-clone-link
- ▼ How can you check if your folder is a git repo on your local machine?
  - ▼ There is a hidden folder in a git repo that you can see by changing settings to see all files including hidden folders.
  - ▼ from command line you can use the command ls -la to list everything including hidden files and folders

▼ If you make a change to your local git repo, how can you see what was changed but not committed?

- ▼ git status

▼ If you create a new file, how can you tell git to start tracking a particular file?

- ▼ git add index.html

▼ How can you tell git to track all the changes you have made to all files?

- ▼ git add .

▼ How can you commit your tracked changes?

- ▼ git commit -m “Add a descriptive message”

▼ How can you add a commit message and a description to your commit?

- ▼ git commit -m “Add message 1” -m “Add description”

▼ How can you reflect the local commited changes in your git repo to a remote github repository?

- ▼ git push origin master

▼ How can you connect your local machine to your Github repository?

- ▼ using SSH keys

▼ How can you create a local git repo on your machine?

- ▼ make a new folder that contains all your files.
- ▼ git init

▼ How can you connect a local git repo to a new remote github repository?

- ▼ Create an empty new repository on github with the same name as the local git repo and copy its ssh link
- ▼ git remote add origin remote_repo_ssh_link

▼ What command can you use to check if a remote repo has been connected to a local repo?

- ▼ git remote -v (to check if remote repo has been connected)

▼ What is branching in git?

▼ In git, branching can be used to make large changes or to introduce new features to your code. If the changes you are making are unfinished and you want to save them, or your changes may break your code, you can make those changes in a new branch so that your original code is safe. Once you are sure that your new changes work, you can merge the code back to your main branch.

▼ What command can you use to see all the branches you have in your local git repo?

▼ git branch

▼ How can you create a new branch in your local git repository?

▼ git checkout -b name_of_new_branch/description

▼ How can you change from current branch to another existing branch called main in your local git repo?

▼ git checkout main

▼ How can you compare two versions of code in your local git?

▼ git diff branch1 (will show changes between current branch and branch1)

▼ How can you push changes from a branch called branch1 on your local system to the same branch on github?

▼ Make sure you are on branch1 - git checkout branch1

▼ Add and commit the required files

▼ git push origin branch1

▼ What is a pull request on Github?

▼ A pull request is a request to have your code pulled in from one branch into another branch. For example, you can create a pull request to have your code from a branch called branch1 merged into a branch called main.

▼ How can you pull changes from Github into your local git repo?

▼ git pull origin master

▼ How can you delete a branch after you have merged code changes into another branch on Github?

- ▼ git branch -d branch_name

▼ How can you merge a branch called master into your working branch called branch1 locally in your git repo?

- ▼ Pull changes to master into your local repo - git pull origin master
- ▼ change to branch1 - git checkout branch1
- ▼ merge changes in master to branch1 - git merge master

▼ How can you resolve merge conflicts in git?

- ▼ We can resolve locally in a code editor like VS code?
- ▼ We can resolve on Github on the UI interface

▼ How can you undo a staged change (added with git add)?

- ▼ git reset
- ▼ git reset filename

▼ What is the name of the pointer to access the most recent commits you made in your local git repository?

- ▼ HEAD will refer to the current commit and HEAD~1 will refer to commit before the current commit on the same branch.

▼ How can you undo the most recent commit in your local git repo?

- ▼ git reset HEAD~1

▼ How can you see a history of all your commits?

- ▼ git log

▼ How can you undo a commit with a certain commit hash?

- ▼ Go to git log and copy the hash of the commit you want to undo
- ▼ git reset commit_hash

▼ Undo all the changes to the files as well not just changes to staging?

- ▼ git reset --hard commit-hash

R basics

- What is an atomic vector in R?
  - Every element in a vector is the same type. For example, a vector of all characters or all numerics, or all integers or all logicals etc.
- What is a list in R?
  - A data structure in R that can contain many different data types. It is more flexible than a vector.
- What is a matrix in R?
  - An atomic vector in multiple dimensions in called a matrix.
- What is a dataframe in R?
  - A dataframe is a more flexible matrix that can contain many different datatypes.
  - Dataframes are list of R vectors of the same length
- What is a factor in R?
  - A factor is a vector where each element can take only a discrete number of values.
- What does the pipe operator do in R?
  - A pipe operator is used to combine several functions in sequence in a way that is easily understandable to someone reading the code.

The rest of the concepts about creating different data structures, using dplyr to work with dataframes and using ggplot2 to visualize the data are covered in a file called Rbasics.R

Bash basics

- What is bash and when do you use need to it?
  - Bash is a command processor that typically runs in a text window where the user types commands that cause some actions. Bash can also read and execute commands from a file, called a shell script.

▼ Bash is used when we do not have a graphical user interface or when we need to perform an action hundreds or thousands of times.

▼ What is the basic structure of a shell command?

▼ [command] [options] [arguments]

▼ How can you take the output of a previous command as input to another command?

▼ We can use pipe operator, |

▼ Example, cat states.txt | wc -l command will print out the file called states.txt and count the number of words in the outpyt

▼ What should be the first line of a bash script?

▼ #!/usr/bin/bash

▼ What is the extension of a file containing a bash script?

▼ .sh

▼ How can you run a file called math.sh in your terminal or command line interface?

▼ bash math.sh

▼ What command can you use to print something in a bash script to the terminal output?

▼ echo

▼ What command can you use to evaluate a math expression in a bash script?

▼ expr

▼ How can you print a variable called number, defined in your bash script, to your terminal window?

▼ echo $number

▼ How can you modify the value of a variable called number by adding 1 to it in a bash script?

▼ let number=$number+1

▼ How can you run a command in a bash script like you would on the CLI and store the result in a variable?

- ▼ We can wrap the command in a $ sign and assign it to a variable.

▼ How can you print out all positional arguments given to bash at the command line using a bash script?

- ▼ echo “$@”

▼ How can you print out the total number of arguments given to bash at the command line using a bash script?

- ▼ echo “$#”

▼ How can you print out the second argument given to bash at the command line using a bash script?

- ▼ echo “$2”

▼ How can you get an interactive response from user from the command line through a bash script?

- ▼ read response

▼ How can you print the exit status of a command in the bash script to your terminal?

- ▼ echo $? will print the exit status of the last command you executed to the terminal

▼ What does the AND operator in bash do?

- ▼ the program on the right side of && will only be executed if the program on the left side of && has an exit status of 0

▼ What does the OR operator in bash do?

- ▼ The OR operator ||. The commands on the right hand side of || operator are only executed if the command on the left hand side fails.

▼ What is the syntax for providing a conditional expression in a bash script?

- ▼ [[conditional expression]]

▼ How can you check if a file exists in a bash script?

▼ Using the -e flag

▼ [[-e “filepath”]]

▼ echo “The exist status of filepath is : $?”