

# Introduction to programming

## Lecture 4:

- GitHub

MCNB - Winter semester 2025/2026



Next lecture (November 11) online!

<https://fu-berlin.webex.com/meet/prs8468ox43645>

# Coin throw practice (10 minutes)

Find the mistake in the code below.

We're trying to simulate 20 coin throws.

If a random number ranging between 0 and 1 is lower or equal 0.5, the coin shows "heads".  
If it's higher than 0.5, the coin shows "tails".

```
coin_flip_results = cell(0);
for i=1:20
    if rand(1) <= .5
        coin_flip_results{end+1} = 'heads';
    elseif rand(1) > .5
        coin_flip_results{end+1} = 'tails';
    end
end
```

Do you get 20 "heads" or "tails"? If not, why not?

# GitHub

# GitHub

**What is GitHub?**: GitHub is a collaboration platform that uses [Git](#) for versioning. It is the most popular platform to store, share, and contribute to software.

**Version control**: is the practice of tracking and managing changes to a file or set of files over time, allowing users to collaborate, recall specific versions later, and revert to previous states.

**Git versioning**: <https://www.youtube.com/watch?v=OqmSzXDrJBk&list=LL&index=1>



# Repositories

**What is a repository?**: A [repository](#) is a project containing files and folders. A repository tracks versions of files and folders. For more information, see "[About repositories](#)" from GitHub Docs.

The screenshot shows a GitHub user profile for `gifale95`. The top navigation bar includes links for Overview, Repositories (9, highlighted with a red box), Projects, Packages, and Stars (72). A search bar and various filter options are also present. Below the navigation, there's a large circular profile picture of a man with a beard. The user's name, **Alessandro Gifford**, and GitHub handle, `gifale95`, are displayed. A brief bio states: "Postdoc, Computational Visual Neuroscience".

The main content area displays three repositories:

- skills-introduction-to-github** (Public)  
My clone repository  
MIT License Updated 33 minutes ago
- BERG** (Public)  
Trained encoding models to generate in silico neural responses for arbitrary stimuli.  
eeg computational-neuroscience dataset fmri human-vision  
Jupyter Notebook 31 5 Other Updated 2 hours ago
- gifale95** (Public)  
Updated yesterday

# Branches

**What is a branch?**: A [branch](#) is a parallel version of your repository. By default, your repository has one branch named `main` and it is considered to be the definitive branch. Creating additional branches allows you to copy the `main` branch of your repository and safely make any changes without disrupting the main project. For more information, see "[About branches](#)".

The screenshot shows a GitHub repository page for a user named BERG. The top navigation bar includes links for Code, Issues, Pull requests, Actions, Projects, Security, Insights, and Settings. Below the navigation is a header with the user's profile picture, the repository name 'BERG', and a 'Public' badge. To the right are buttons for Pin, Unwatch (with 2 notifications), Fork (with 5 forks), and Starred (with 31 stars). The main content area displays a list of commits and files. A red box highlights a modal window titled 'Switch branches/tags' with a search bar and a list of branches: main (selected and marked as 'default'), development, fb\_aws, github\_actions, and new\_models. Below the modal is a link to 'View all branches'. The right sidebar contains sections for 'About', 'Trained encoding models to generate in silico neural responses for arbitrary stimuli.', a link to 'www.alegifford.com/projects/nest/', and a list of tags: eeg, computational-neuroscience, dataset, fmri, human-vision, encoding-models, synthetic-neural-responses, and in-silico-neuroscience. At the bottom are links for Readme, View license, and Activity.

Code Issues Pull requests Actions Projects 1 Security Insights Settings

BERG Public

Pin Unwatch 2 Fork 5 Starred 31

Switch branches/tags

Find or create a branch...

Branches Tags

main (default)

development

fb\_aws

github\_actions

new\_models

View all branches

29c78e8 · 2 months ago 384 Commits

date fmri-nsd\_fsaverage-huze.yaml

date 02\_plot.py

date fmri-nsd\_fsaverage-huze.rst

etc nest\_Adding\_Models\_Tutorial.ip...

large branch 'main' into development

for ReadTheDocs

at LICENSE.md

About

Trained encoding models to generate in silico neural responses for arbitrary stimuli.

[www.alegifford.com/projects/nest/](http://www.alegifford.com/projects/nest/)

eeg computational-neuroscience

dataset fmri human-vision

encoding-models

synthetic-neural-responses

in-silico-neuroscience

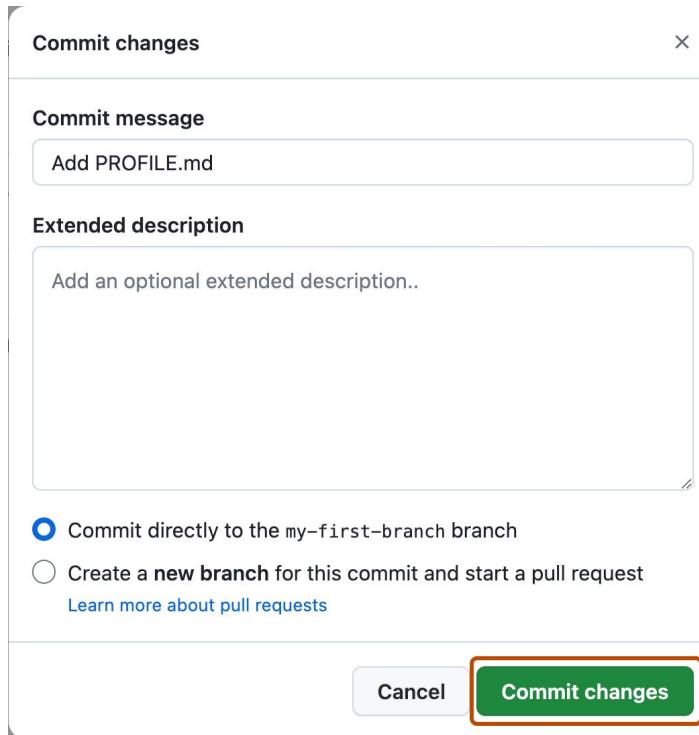
Readme

View license

Activity

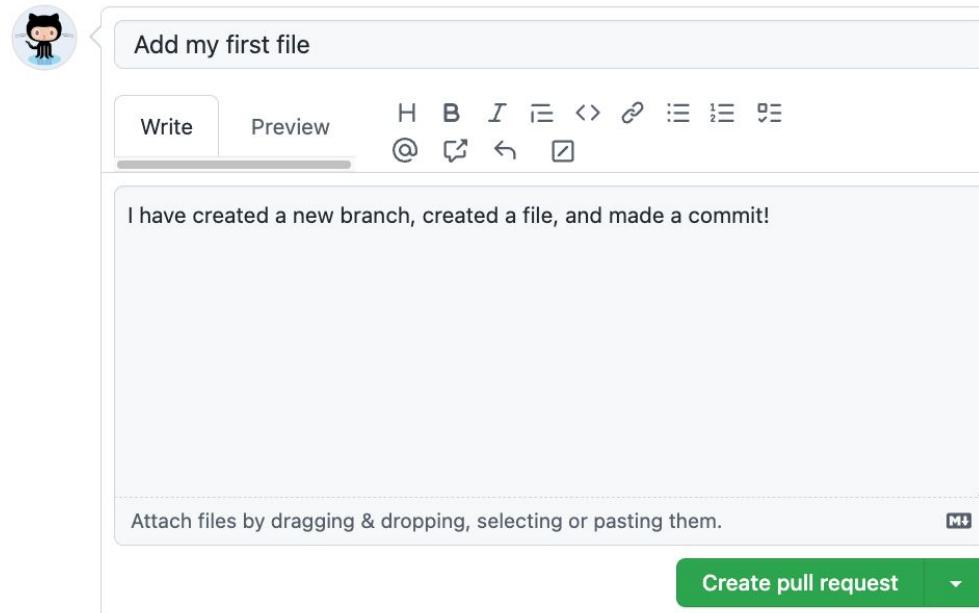
# Commit changes

**What is a commit?**: A [commit](#) is a set of changes to the files and folders in your project. A commit exists in a branch. For more information, see "[About commits](#)".



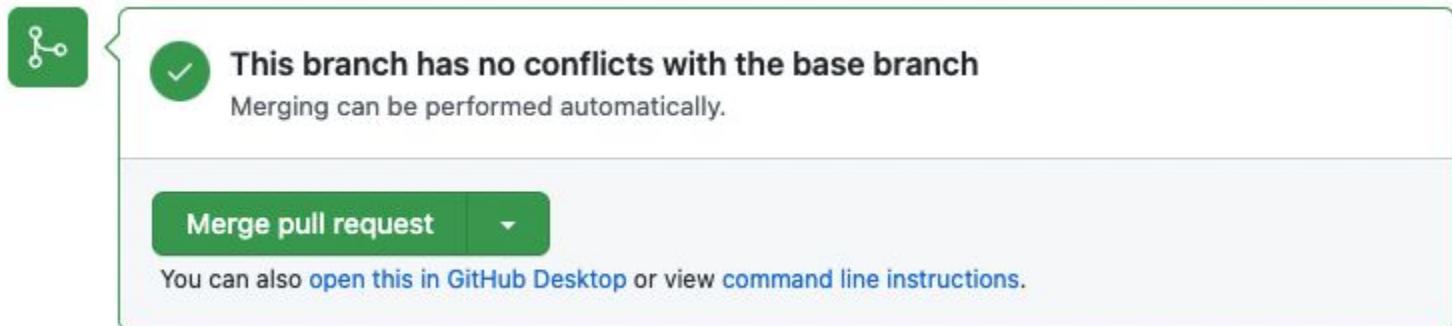
# Pull requests

**What is a pull request?**: Collaboration happens on a [pull request](#). The pull request shows the changes in your branch to other people and allows people to accept, reject, or suggest additional changes to your branch. In a side by side comparison, this pull request is going to keep the changes you just made on your branch and propose applying them to the *main* project branch. For more information about pull requests, see "[About pull requests](#)".



# Merges

**What is a merge?**: A [merge](#) adds the changes in your pull request and branch into the *main* branch. For more information about merges, see "[Merging a pull request](#)".



# Repository README (Markdown)

```
1 # In silico discovery of representational relationships  
2 across visual cortex  
3  
4 Here we provide the code to reproduce all results from the  
5 paper:<br>  
6 "[In silico discovery of representational relationships  
7 across visual cortex][paper_doi]"<br>  
8 Alessandro T. Gifford, Maya A. Jastrzębowska, Johannes J.D.  
9 Singer, Radosław M. Cichy<br>  
10 _Nature Human Behavior_, 2025  
11  
12 ## 📄 Paper abstract  
13  
14 Human vision is mediated by a complex interconnected  
15 network of cortical brain areas that jointly represent  
16 visual information. Although these areas are increasingly  
17 understood in isolation, their representational  
18 relationships remain unclear. Here we developed relational  
19 neural control and used it to investigate the  
20 representational relationships for univariate and  
21 multivariate functional magnetic resonance imaging (fMRI)  
22 responses of areas across the visual cortex. Through  
23 relational neural control, we generated and explored in  
24 silico fMRI responses for large numbers of images,  
25 discovering controlling images that align or disentangle  
26 responses across areas, thus indicating their shared or  
27 unique representational content. This revealed a typical  
28 network-level configuration of representational  
29 relationships in which shared or unique representational  
30 content varied on the basis of cortical distance,  
31 categorical selectivity and position within the visual  
32 hierarchy. Closing the empirical cycle, we validated the in  
33 silico discoveries on in vivo fMRI responses from  
34 independent participants. Together, this reveals how visual  
35 areas jointly represent the world as an interconnected
```



## In silico discovery of representational relationships across visual cortex

Here we provide the code to reproduce all results from the paper:

"In silico discovery of representational relationships across visual cortex"

Alessandro T. Gifford, Maya A. Jastrzębowska, Johannes J.D. Singer, Radosław M. Cichy

*Nature Human Behavior*, 2025

### 📄 Paper abstract

Human vision is mediated by a complex interconnected network of cortical brain areas that jointly represent visual information. Although these areas are increasingly understood in isolation, their representational relationships remain unclear. Here we developed relational neural control and used it to investigate the representational relationships for univariate and multivariate functional magnetic resonance imaging (fMRI) responses of areas across the visual cortex. Through relational neural control, we generated and explored in silico fMRI responses for large numbers of images, discovering controlling images that align or disentangle responses across areas, thus indicating their shared or unique representational content. This revealed a typical network-level configuration of representational relationships in which shared or unique representational content varied on the basis of cortical distance, categorical selectivity and position within the visual hierarchy. Closing the empirical cycle, we validated the in silico discoveries on *in vivo* fMRI responses from independent participants. Together, this reveals how visual areas jointly represent the world as an interconnected

# Repository real example (I)

gifale95 / RNC

Type to search

Code Issues Pull requests Actions Projects Security 13 Insights Settings

RNC Public

Pin Unwatch 1 Fork 1 Star 2

m... 1 Branch 2 Tags Go to file

Code

gitale95 Added paper info 2ec0920 · 4 months ago 55 Commits

00\_generate\_insilico\_fmri\_respo... NEST to BERG 4 months ago

01\_in\_silico\_fmri\_encoding\_accu... NEST to BERG 4 months ago

02\_univariate\_rnc Revised paper 6 months ago

03\_generative\_univariate\_rnc NEST to BERG 4 months ago

04\_multivariate\_rnc Revised paper 6 months ago

05\_multivariate\_rnc\_retinotopy NEST to BERG 4 months ago

06\_rnc\_categorical\_slectivity Revised paper 6 months ago

About

Algorithms to investigate (through neural control) the representational relationships between univariate or multivariate in silico fMRI responses of multiple visual areas of the brain.

[www.alegifford.com/projects/rnc/](http://www.alegifford.com/projects/rnc/)

deep-neural-networks eeg  
computational-neuroscience fmri  
human-vision neural-control  
retinotopic-cortex mid-level-vision  
encoding-models

Readme

# Repository real example (II)

courtois-neuromod / **algonauts\_2025.competitors**  

 **Code**  Issues 1  Pull requests  Actions  Projects  Security 20  Insights  Settings

 **algonauts\_2025.competitors** 

 Edit Pins  Watch 5  Fork 18  Starred 56

 m...  8 Branches  0 Tags  Go to file    Code

 **bpinsard** fix DATS dates  96750e7 · last month  85 Commits

|   |   |               |
|---|---|---------------|
|  .datalad          | add rewrite rule for https submodule d... | 10 months ago |
|  .github/workflows | set wanted public remotes                 | 3 months ago  |
|  code              | Added phase 2                             | 3 months ago  |
|  fmri              | add transcripts and fmri samples          | 4 months ago  |
|  media             | Updated banner                            | 10 months ago |
|  stimuli           | add transcripts and fmri samples          | 4 months ago  |
|  tutorial          | Added benchmark info                      | 3 months ago  |

**About** 

Data and code for the Algonauts Project 2025 challenge.

 [algonautsproject.com/](http://algonautsproject.com/)


 Readme  
 CC0-1.0 license  
 Activity  
 Custom properties  
 56 stars

# Repository real example (III)

gifale95 / BERG

Type  to search

Code Issues Pull requests Actions Projects 1 Security Insights Settings

BERG Public Pin Unwatch 2 Fork 5 Starred 31

m... 5 Branches 4 Tags Go to file

Code

About

Trained encoding models to generate in silico neural responses for arbitrary stimuli.

[www.alegifford.com/projects/nest/](http://www.alegifford.com/projects/nest/)

eeg computational-neuroscience  
dataset fmri human-vision  
encoding-models  
synthetic-neural-responses  
in-silico-neuroscience

Readme View license Activity

| File / Commit      | Description                              | Date         |
|--------------------|--|--------------|
| berg               | Update fmri-nsd_fsaverage-huze.yaml      | 2 months ago |
| berg_creation_code | Update 02_plot.py                        | 3 months ago |
| source             | Update fmri-nsd_fsaverage-huze.rst       | 2 months ago |
| tutorials          | Delete nest_Adding_Models_Tutorial.ip... | 4 months ago |
| .gitignore         | Merge branch 'main' into development     | 4 months ago |
| .readthedocs.yaml  | Fix for ReadTheDocs                      | 6 months ago |
| LICENSE.md         | Create LICENSE.md                        | 7 months ago |

# Assignment 4

# Assignment 4a: GitHub Tutorials

Create a GitHub account.

Complete the following tutorials:

- <https://github.com/skills/introduction-to-github>
- <https://github.com/skills/communicate-using-markdown>

Send me the screenshot of the final README of each tutorial:

- Before the next lecture on November 11.
- Include your name and the course number (127050) in the email subject.
- [alessandro.gifford@gmail.com](mailto:alessandro.gifford@gmail.com)

## Assignment 4b: Create your own GitHub course repo

Create a **repository** of this course, and make it public.

Add to the repository the **\* .m files** of the previous Assignments 2-3.

**Note:** you can also do this **locally** from your computer by using the terminal (for this, see the “*Git Tutorial*” and “*Git and GitHub*” sections of [this page](#)), or by using the GitHub extensions of VS Code.

Send me the **link** of your public repository:

- Before the next lecture on November 11.
- Include your name and the course number (127050) in the email subject.
- [alessandro.gifford@gmail.com](mailto:alessandro.gifford@gmail.com)