Day II - Part II - GitHub exercise

December 9, 2020

1 GitHub exercise

The final part of the workshop focuses on implementing a software package for calculating different distance measures. The exercise uses the hosting service GitHub.

This part of the workshop covers:

- Creating GitHub repositories
- Packaging and testing software
- Creating pull request
- Lincense
- Package documentation
- Continuous integration

GitHub is one hosting service but several other exists, for example:

- GitLab: https://about.gitlab.com

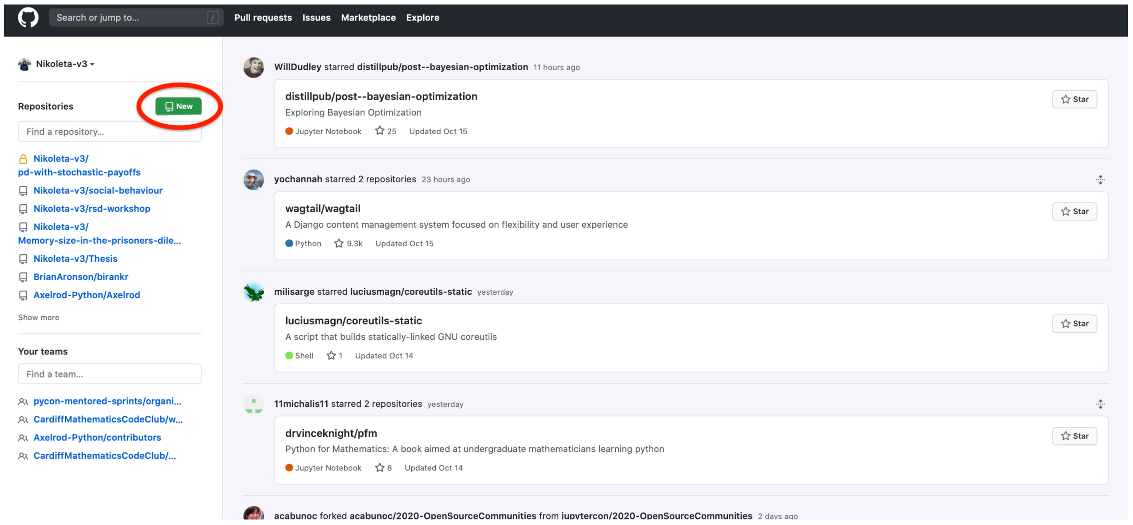
2 Log in GitHub

Initially make sure that you are logged in your GitHub account: https://github.com.

3 Create a repository for the project

A software repository, or “repo” for short, is a storage location for software packages.

To create a repository on GitHub click on “New” located at the left side of the home page.



Nikoleta-v3/pd-with-stochastic-payoffs
Nikoleta-v3/social-behaviour
Nikoleta-v3/rsd-workshop
Nikoleta-v3/Memory-size-in-the-prisoners-dile...
Nikoleta-v3/Thesis
BrianAronson/birankr
Axelrod-Python/Axelrod

pycon-mentored-sprints/organi...
CardiffMathematicsCodeClub/w...
Axelrod-Python/contributors
CardiffMathematicsCodeClub/...

WillDudley starred distillpub/post--bayesian-optimization 11 hours ago

distillpub/post--bayesian-optimization
Exploring Bayesian Optimization
Jupyter Notebook 25 Updated Oct 15

yochannah starred 2 repositories 23 hours ago

wagtail/wagtail
A Django content management system focused on flexibility and user experience
Python 9.3k Updated Oct 15

milisarge starred luciusmagn/coreutils-static yesterday

luciusmagn/coreutils-static
A script that builds statically-linked GNU coreutils
Shell 1 Updated Oct 14

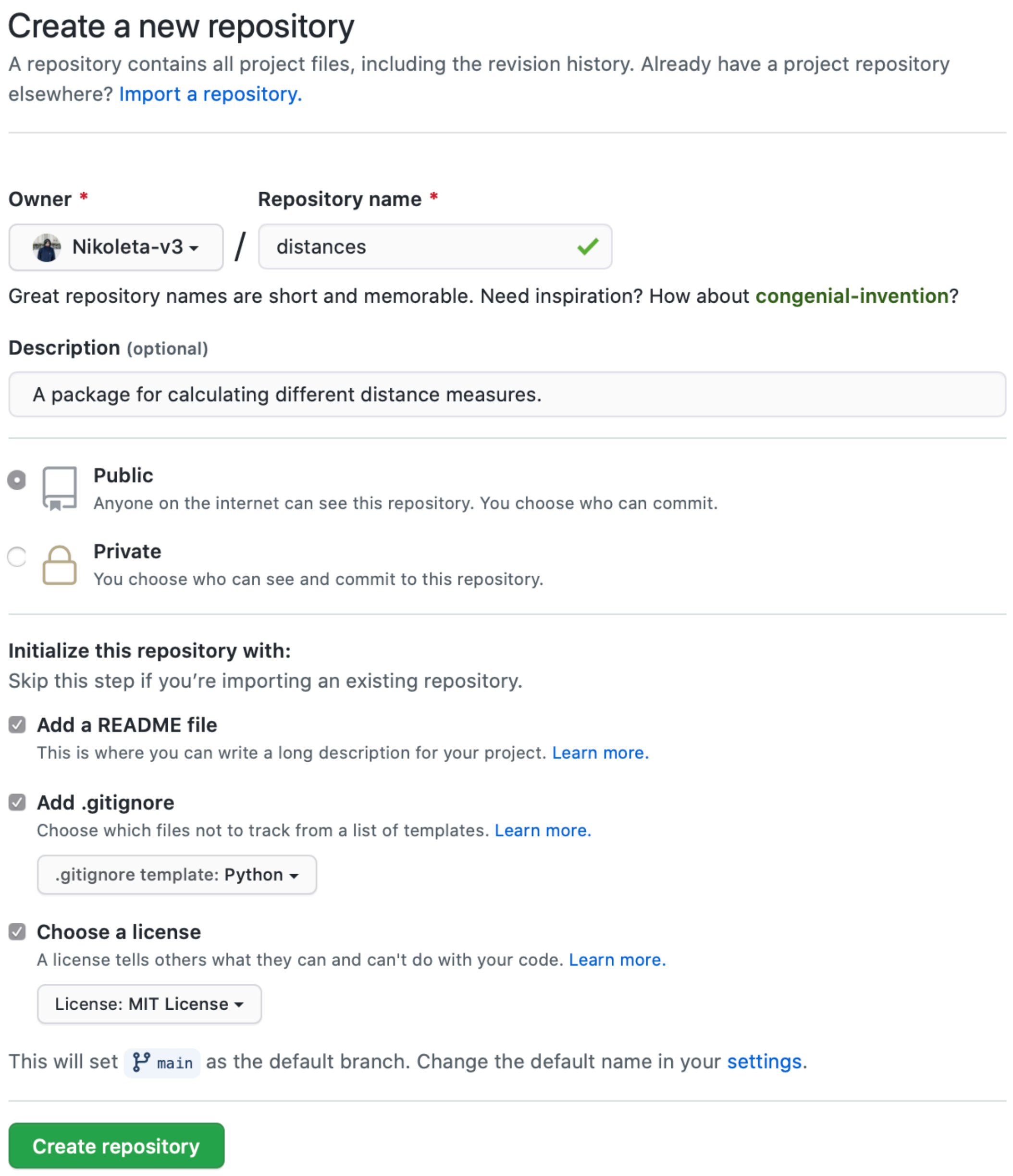
11michalis11 starred 2 repositories yesterday

drvinceknight/pfm
Python for Mathematics: A book aimed at undergraduate mathematicians learning python
Jupyter Notebook 8 Updated Oct 14

acabunoc forked acabunoc/2020-OpenSourceCommunities from jupytercon/2020-OpenSourceCommunities 2 days ago

Here we are going to create the project's repository.

- **Repository name**: distances
- **Description**: A package for calculating different distance measures.
- **Private**. We are going to create a private repository as this is an artificial exercise.
- **Initialize this repository**. GitHub allows us to initialize a repository with a series of standard files. We want to include:
  – A README. A README file contains information about other files in a directory or archive of computer software.
  – A .gitignore. Select the templete Python
  – A lincense. Select the MIT License.


Create a new repository

A repository contains all project files, including the revision history. Already have a project repository elsewhere? Import a repository.

Owner * Nikoleta-v3 / Repository name * distances

Great repository names are short and memorable. Need inspiration? How about congenial-invention?

Description (optional)

A package for calculating different distance measures.

[✓ Public] Anyone on the internet can see this repository. You choose who can commit.

Private You choose who can see and commit to this repository.

Initialize this repository with:

Skip this step if you're importing an existing repository.

[✓] Add a README file

This is where you can write a long description for your project. Learn more.

[✓] Add .gitignore

Choose which files not to track from a list of templates. Learn more.

.gitignore template: Python

[✓] Choose a license

A license tells others what they can and can't do with your code. Learn more.

License: MIT License

This will set `main` as the default branch. Change the default name in your settings.

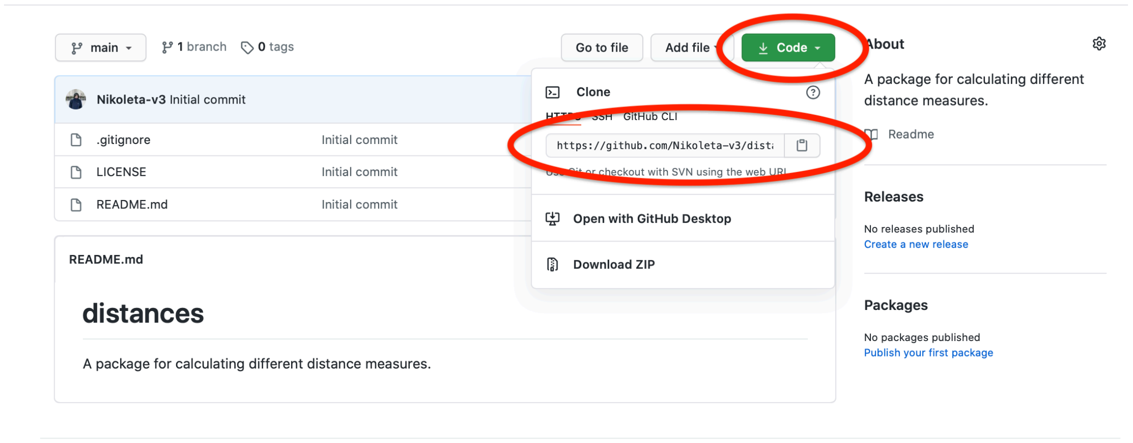
Create repository

We click `create repository` and this creates our repository.

4 Clone the repository

When we create a repository on GitHub, we create a project that exists as a remote repository. We can clone our repositories to create a local copy on our computers and sync between the two locations.

To clone a GitHub repository we need to copy it's address:



Nikoleta-v3 Initial commit	
.gitignore	Initial commit
LICENSE	Initial commit
README.md	Initial commit

```
https://github.com/Nikoleta-v3/dist…
```

Use Git or checkout with SVN using the web URL.

A package for calculating different distance measures.

README.md

distances

A package for calculating different distance measures.

and run the following command in a terminal/command prompt:

```
$ git clone <the_address_we_just_copied>
```

Make sure that you run this command while on the location you want to clone the repository.

For example if I wanted to clone the repository on my Deskop I would run the following commands:

```
$ cd Desktop
$ git clone https://github.com/Nikoleta-v3/distances.git
```

5 Brach

When working on a project we hardly ever work on the `master` branch. Instead we create different branches for working on different parts of a project.

So let's create a branch called `implement-distances-package`.

```
$ git branch implement-distances-package
$ git checkout implement-distances-package
```

The repository's structure right now is as follows:

```
|--- .gitingore
|--- LICENSE
|--- README.md
```

Spend some time now to familirie yourself with the structure and the current files of the repository.

6 Implement the distance function

We are now ready to write a package that calculates distances.

1. We will create a folder called `distances`. This can be done with the command:

```
$ mkdir distances
```

2. In the folder we just created we are going to add a file called `euclidean.py`. This file will contain the code needed to calculate the euclidean distance of two vectors.

Alter the file `euclidean.py` to contain the following lines of code:

```python
import math

def euclidean_distance(u, v):
    """
    Computes the Euclidean distance between two vectos `u` and `v`.

    The Euclidean distance between `u` and `v`, is defined as:

    \sqrt{(u_1 - v_1) ^ 2 + ... + (u_n - v_n) ^ 2}

    Parameters
    ----------
    u : list
        Input vector.
    v : list
        Input vector.

    Returns
    -------
    euclidean : double
        The Euclidean distance between vectors `u` and `v`.
    """
    distance = 0

    for u_i, v_i in zip(u, v):
        distance += (u_i - v_i) ** 2

    return math.sqrt(distance)
```

3. Now that the function is implemented we need to commit the change.

```
$ git add distances/euclidean.py
$ git commit
```

You can use the following commit message:

```
implement euclidean distance
```

The structure of the repository should now be the following:

```
|--- distances
    |--- euclidean.py
|--- .gitingore
|--- LICENSE
|--- README.md
```

7 Test the function

Now that we have written the function it is time to use it. Creating a test for an implemented function is a great way to:

1. Demonstrate it's usage
2. Test it's implementation

Lets's create a file `test_euclidean.py` at the root of the repository such as the structure now is:

```
|--- distances
    |--- euclidean.py
|--- .gitingore
|--- LICENSE
|--- README.md
|--- test_euclidean.py
```

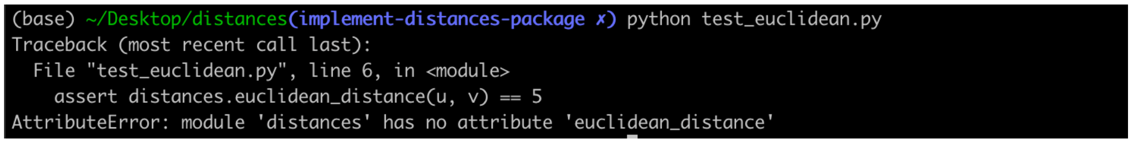
Open `test_euclidean.py` with your editor and alter it so that it looks like:

```
import distances

u = (2, -1)
v = (-2, 2)

print(distances.euclidean_distance(u, v))
```

Trying to run this file using the command:

```
$ python test_euclidean.py
```

should return the following error:



```
(base) ~/Desktop/distances(implement-distances-package ✗) python test_euclidean.py
Traceback (most recent call last):
  File "test_euclidean.py", line 6, in <module>
    assert distances.euclidean_distance(u, v) == 5
AttributeError: module 'distances' has no attribute 'euclidean_distance'
```

In order to let python know that files under the module `distances` we need to creat a file called `__init__.py` which will be under `distances` and will include the following line:

```
from .euclidean import euclidean_distance
```

Now run the command:

```
$ python test_euclidean.py
```

again.

Now let's alter the code to include an `assert` command:

```
import distances

u = (2, -1)
v = (-2, 2)

assert distances.euclidean_distance(u, v) == 5
```

and run `python test_euclidean.py`.

Fantastic. Now, let's commit this change:

```
$ git add test_euclidean.py
$ git add distances/__init__.py
```

with the following commit:

```
add test for the euclidean distance
```

8 Pytest

Currently the command:

```
$ python test_euclidean.py
```

does not give any feedback. In our case that is because the `assert` command is `True` and thus there is nothing to report.

Several packages already exist that can make tests output more useful. An example of such a Python package is `pytest`. `pytest` has been installed on your computers with Anaconda.

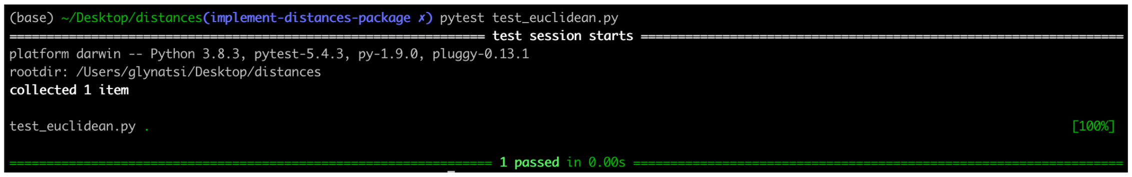
Alter the code in `test_euclidean.py` to:

```python
import distances

def test_euclidean():
    u = (2, -1)
    v = (-2, 2)

    assert distances.euclidean_distance(u, v) == 5
```

and now use the following command to run the tests:

```
$ pytest test_euclidean.py
```

This should return something like:



```
(base) ~/Desktop/distances(implement-distances-package ✗) pytest test_euclidean.py
============================================================== test session starts ===============================================================
platform darwin -- Python 3.8.3, pytest-5.4.3, py-1.9.0, pluggy-0.13.1
rootdir: /Users/glynatsi/Desktop/distances
collected 1 item

test_euclidean.py .                                                                                                                        [100%]

=============================================================== 1 passed in 0.00s ================================================================
```

Now commit the changes with a message: `use the library pytest to run tests`.

The commands are:

```
$ git add test_euclidean.py
$ git commit
```

9 Document the package

When you are developing a software package, you want to make available for other people to use. Thus, you need to document your project.

This include, letting people know how to install your project, its purpose and functionality, its license and how to test it.

All these details can be included on a projects `README.md`.

The current `README.md` of our project looks like this:

10 distances

A package for calculating different distance measures.

Alter the file to include details of your project.

An example of a `README.md`:

11 distances

A package for calculating different distance measures. # Installation The project can be cloned locally using the following command:

```
$ git clone <path>
```

12 Usage

Currently the following distance measures are implemented in the package: - Euclidean distance. # Tests

The package is being tested using `pytest`. To run the test suite use the command:

```
$ pytest test_euclidean
```

13 License

The package is under the MIT license.

Once you are done altering the `README.md` remember to commit your changes.

14 Open a pull request

Our project is now ready. We have implemented a package that can calculate the euclidean distance and we want to share it with the world.

Before we update our copy on GitHub run the command:

```
$ git status
```

We can see that there are a few files that have not been committed, but also that we don't reconsiged these files. You don't need to worry about these files. Let's add them to our `.gitignore`.

So our `.gitingore` should include the lines:

```
__pycache__/
distances/__pycache__/
```

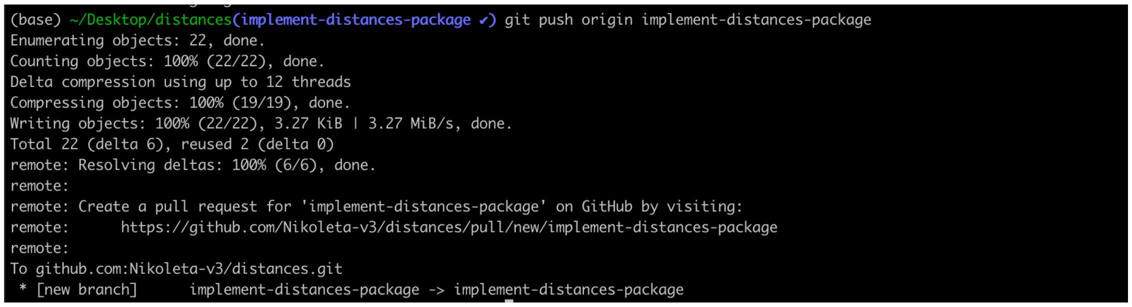
Add the changes, commit and run `git status` again.

Now that everything has been committed we are ready to update the copy of our project on GitHub.

To do that you need to run the following command:

```
$ git push origin implement-distances-package
```

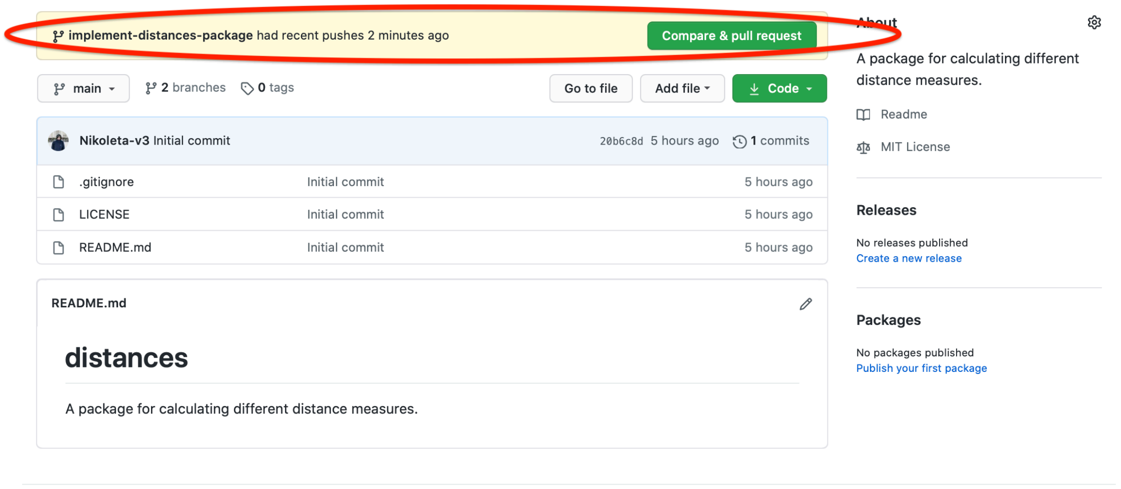
and then you should something like this:



```
(base) ~/Desktop/distances(implement-distances-package ✔) git push origin implement-distances-package
Enumerating objects: 22, done.
Counting objects: 100% (22/22), done.
Delta compression using up to 12 threads
Compressing objects: 100% (19/19), done.
Writing objects: 100% (22/22), 3.27 KiB | 3.27 MiB/s, done.
Total 22 (delta 6), reused 2 (delta 0)
remote: Resolving deltas: 100% (6/6), done.
remote:
remote: Create a pull request for 'implement-distances-package' on GitHub by visiting:
remote:      https://github.com/Nikoleta-v3/distances/pull/new/implement-distances-package
remote:
To github.com:Nikoleta-v3/distances.git
 * [new branch]      implement-distances-package -> implement-distances-package
```

Once you have run the command open GitHub and navigate your project.

There you should see the following:



implement-distances-package had recent pushes 2 minutes ago

Compare & pull request

main · 2 branches · 0 tags · Go to file · Add file · Code

Nikoleta-v3 Initial commit · 20b6c8d 5 hours ago · 1 commits

.gitignore	Initial commit	5 hours ago
LICENSE	Initial commit	5 hours ago
README.md	Initial commit	5 hours ago

README.md

distances

A package for calculating different distance measures.

About

A package for calculating different distance measures.

Readme

MIT License

Releases

No releases published
Create a new release

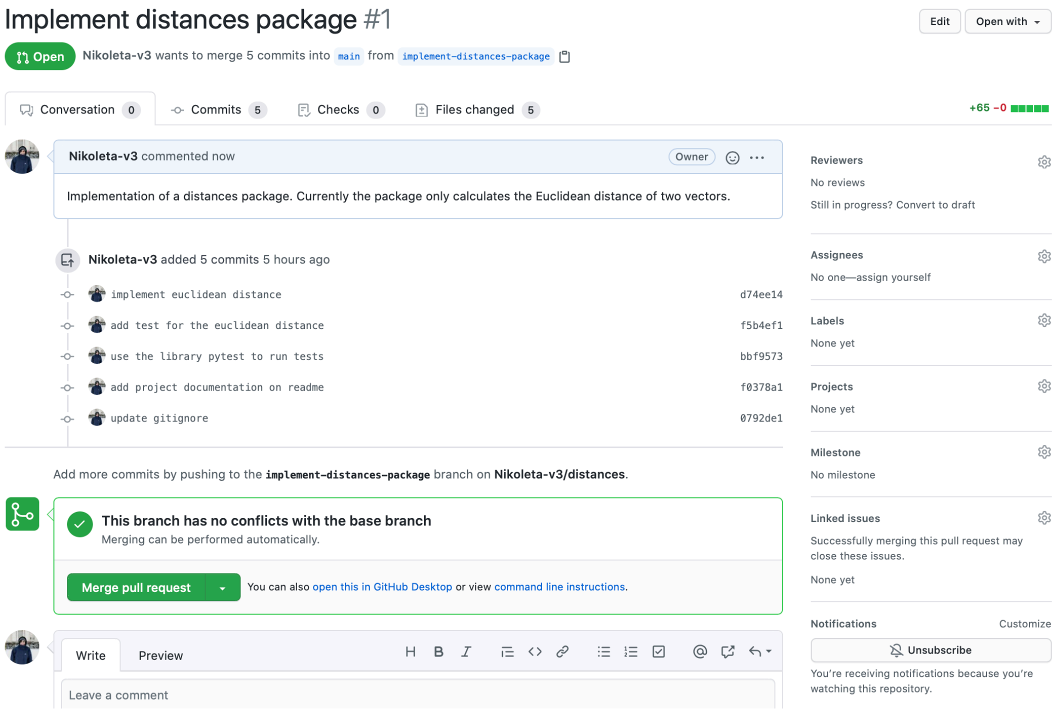
Packages

No packages published
Publish your first package

Click on `Compare & pull request`.

GitHub then transfers you to `Pull request`. Here you can review the changes you have made and `request` for your code to become part of the projects main branch.

Take sometime to familirize yourself with the `Pull request` page and then click on `Create pull request`.



Implement distances package #1

Open Nikoleta-v3 wants to merge 5 commits into `main` from `implement-distances-package`

Conversation 0 · Commits 5 · Checks 0 · Files changed 5 · +65 −0

Nikoleta-v3 commented now

Implementation of a distances package. Currently the package only calculates the Euclidean distance of two vectors.

Nikoleta-v3 added 5 commits 5 hours ago

```
implement euclidean distance              d74ee14
add test for the euclidean distance       f5b4ef1
use the library pytest to run tests       bbf9573
add project documentation on readme       f0378a1
update gitignore                          0792de1
```

Add more commits by pushing to the **implement-distances-package** branch on **Nikoleta-v3/distances**.

This branch has no conflicts with the base branch
Merging can be performed automatically.

Merge pull request · You can also open this in GitHub Desktop or view command line instructions.

Reviewers: No reviews. Still in progress? Convert to draft

Assignees: No one—assign yourself

Labels: None yet

Projects: None yet

Milestone: No milestone

Linked issues: Successfully merging this pull request may close these issues. None yet

Notifications: Customize. Unsubscribe. You're receiving notifications because you're watching this repository.

Congratulations you have created your first pull request!!!!!!

```
[ ]:
```