# Manuscript

## 1. Introduction

## 2. Setting Up a Collaborative Workspace

- How to create a repository in Git Hub
- How to link it to Rstudio
- How to create a project in your local computer and export it to GitHub
- Basic commands for Git and GitHub fromt he RStudio terminal

A collaborative workflow requires a collaborative work space that enables everyone participating to share and contribute to a project.
There are multiple options for such a workspace, like Teams, Discord, or even over e-mail. When working with code however, online repositories on GitHub can be a good alternative.

In this tutorial we assume that you will be working with RStudio and have already downloaded R and Rstudio. In addition you are going to need to have the version control software Git installed and have an account in GitHub. If you need guidance for this you can find a helpful tutorial here.

#### What is a repository?

A repository is basically like a project box where you collect all the files, data, graphs and code scripts from your project.
Online repositories can be accessed from the internet and from any computer, while a local repository is only stored in a specific computer and cannot be accessed elsewhere. When setting up a collaborative work space its advantageous to have an online repository so that multiple people can contribute from their own computer to a shared repository, without having to send files by mail etc. In addition we can connect the online repository what a local repository which allows us to work and make changes using our own computer and then we can upload it to the online repository.

### What is Git?

Git is a version control software that allows you to track the different version of your files. It basically allows you to keep a detailed history of changes you have done in your document and also what other people have added or removed in your collaborative documents. Having a version controls software set up for your workflow is very handy as it prevents major losses of documents and changes, and if any error is introduced in a document or code, you can track it back to see what and who submitted it. This fosters reproducibility, transparency, collaboration and robustness for your project.

### What is GitHub?

GitHub is a collaborative online platform that allows you to host and join online repositories. its kinda like facebook for coding. gitHub allows us to share and collaborate with the people on the same code at the same time. It can also be used to host webpages and other stuff.

In this toturial we will only work with the RStudio interface and the online GitHub interface. however, if you want an expanded commandline and interface for GitHub you can use GitHUb CLI and/or GitHub Desktop. See toturials here: GitHub CLI and GitHub Desktop.

## 2.1 How to create a project that is connected between RStudio and GitHub?

When creating a new project and you want to link your local project with an online repository, you can go about it to ways basicly.
a) You can create the online repository and then clone it down to you computer
b) You can create a local repository and then push it online to GitHub

We´ll go through both options here, starting with the online repository.

Image file path:

resources/images/

### 2.1.1 Starting with an online repository

#### Step 1. Create a new online repository in GitHub (Video tutorial)

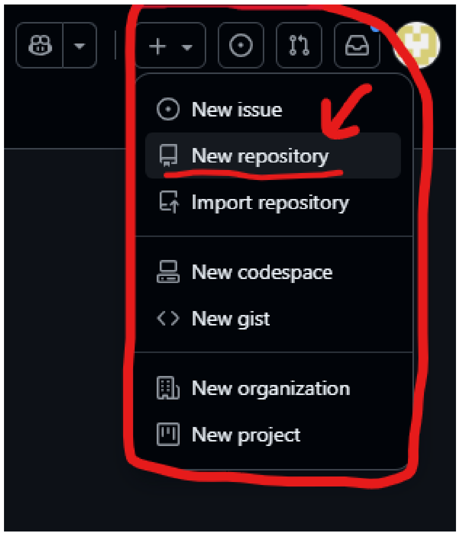


Figure 1: Creating a new online repository.

Once you´ve logged into GitHub, navigate to the top right corner of your page and find the + tab. Drop it down to reveal the "New repository" option. Click on it.

This will take you ta the repository creation page.
Here you give your repository a name, a description of what it will entail and wherever it is public or not.

You also have the options of adding a README file and a .gitignore file upon creation, but it is possible to create these after the repository is made as well.

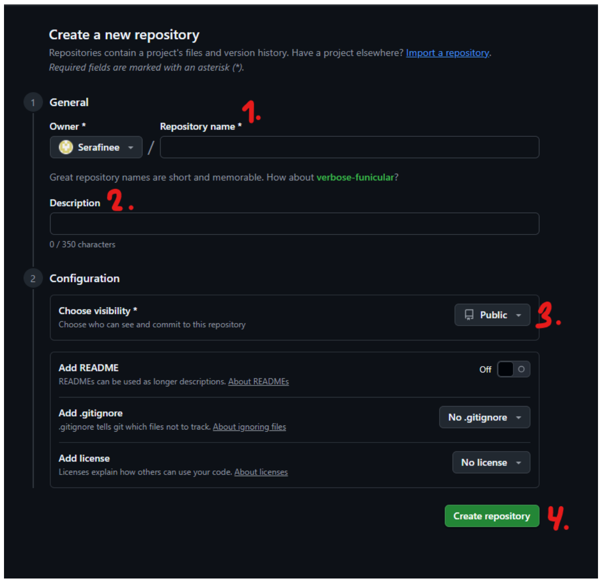
#### README

A README file is a descriptive file that should explain what the project/repository is about, how it is organized and what the data in it means etc. Any additional information you want people to know when using your repository should go into the README.

#### .gitignore

The .gitignore file is an information file that tells Git what types of files it should track, or specifically not track. This is useful when you for example don't want to track the generated images or graphs from your code, but just your code.

So, now that you have created your first online repository you want to connect it to your local computer. You can do this multiple ways, but in this tutorial we´ll use commands in the terminal to initialize



Create a new repository

Repositories contain a project's files and version history. Have a project elsewhere? Import a repository.
*Required fields are marked with an asterisk (*).*

1 General

Owner * Serafinee / Repository name * 1.

Great repository names are short and memorable. How about verbose-funicular?

Description 2.

0 / 350 characters

2 Configuration

Choose visibility * Public 3.
Choose who can see and commit to this repository

Add README Off
READMEs can be used as longer descriptions. About READMEs

Add .gitignore No .gitignore
.gitignore tells git which files not to track. About ignoring files

Add license No license
Licenses explain how others can use your code. About licenses

Create repository 4.

Figure 2: Repository setup-page.

### Step 2: Copy the Repository URL

1. Go to your GitHub repository page.
2. Click the green **Code** button.
3. Copy the repository URL:
   - For example: `https://github.com/yourusername/repositoryname.git`

### Step 3: Open RStudio and Clone the Repository

1. Open RStudio.
2. Go to **File** → **New Project** → **Version Control** → **Git**.
3. Paste the GitHub repository URL into the "Repository URL" field.
4. Choose a folder on your local computer where you want to clone the repository.
5. Click **Create Project**.when doing a commit on a file that has been staged, that version of the file goes into the version history. It is also tracked.

And tada! You have now cloned the online repository to your computer! Great job!

### Step 4 (Optional): Configure Git in RStudio

If this is your first time using Git with RStudio, you'll need to configure your Git credentials. Open the RStudio terminal (**Tools** → **Terminal**) or navigate to the **terminal tab** at the top right of the RStudio interface and run the following commands:

```
git config -global user.name "Your Name"

git config --global user.email "your_email@example.com"
```

Replace the placeholder names in "Your Name" and "your_email@example.com" with your own.

Now, what if you wanted to do it the other way around, like if you already have a local project on your computer and want to create an online repository for it?

### 2.1.2 Starting with a local project in RStudio

#### Step 1. Create a New Local Project in RStudio

If you already have a local project, you can skip this step. If not:

1. Open **RStudio**.
2. Go to **File** > **New Project** > **New Directory** > **New Project**.
3. Choose a folder where you want the project to live and give it a name.
4. Make sure to check the box **Create a Git repository**.
5. Click **Create Project**.

This initializes a local Git repository in your project directory.

If you already have made a project but it is not connected to a Git repository you can do it like this:

1. Navigate to **Tools** > **Project Options** > **Git/SVN**.
2. Select **Git** and click **Yes** when prompted to initialize a Git repository for your project.

#### Step 2. Create a New Repository on GitHub

1. Create a new repository in Git Hub like previously in section 2.1.1 step 1
   - Do **not** initialize the repository with a README, `.gitignore`, or license (we'll connect the existing local repository later).

You now have a new, empty GitHub repository.

#### Step 3. Link the Local project to the GitHub Repository

1. Copy the URL in the same way as previously in section 2.1.1 step 2.
2. Open the **Terminal** in RStudio (or use any terminal on your computer).
3. Navigate to your project folder, if you're not already there using this command in the terminal
4. Add the GitHub repository as the remote origin using this command in the terminal:

```
git remote add origin https://github.com/yourusername/your-repository.git
```

5. Verify the remote connection using this command in the terminal

```
git remote -v
```

You should be able to see something like this:

```
origin  https://github.com/yourusername/your-repo.git (fetch)
origin  https://github.com/yourusername/your-repo.git (push)
```

That means you have now successfully established a connection between your local project and the online repository on GitHub. Congratulations!

## 2.2 Workflow between local and online repositories

Now that we have connected or local repository with the online one, we can start to push out some code! But before we jump to the commands for placing files in and out of our online repository, we should better understand how these commands actually function.

When you are

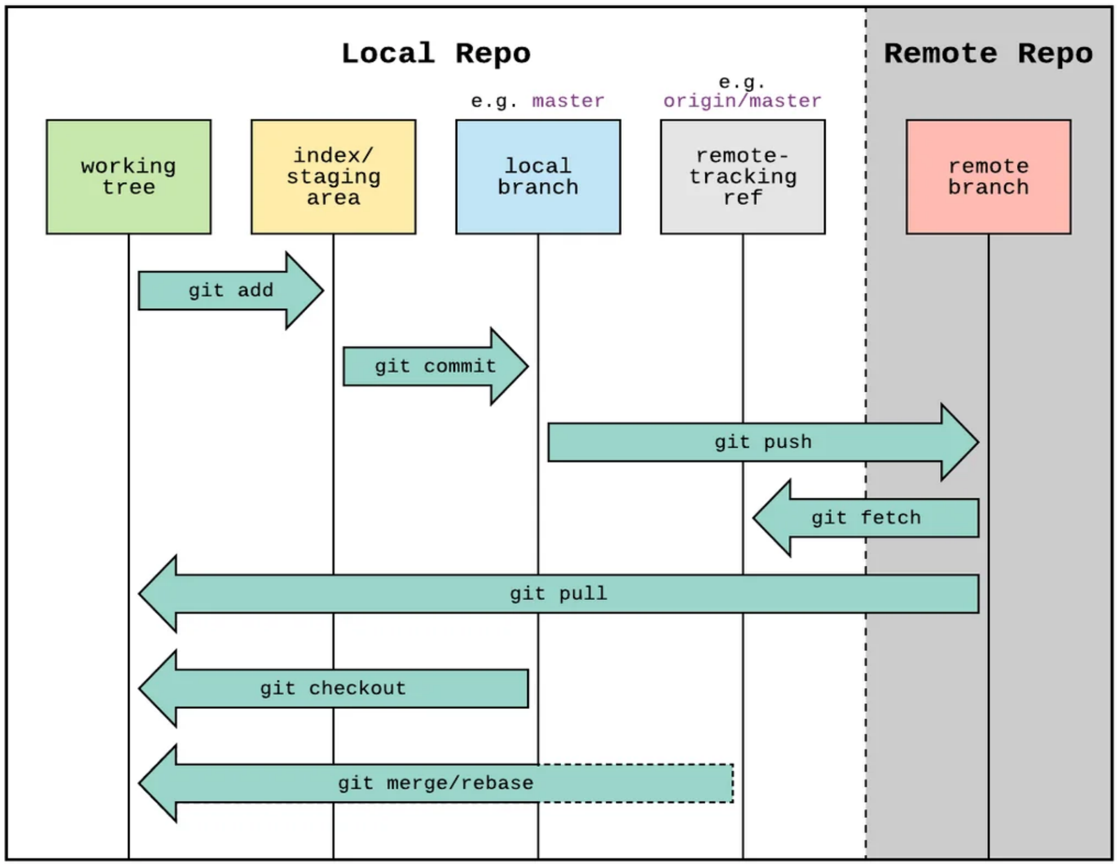


Figure 3: Visaluzation of local and online workflow in Rstudio.

To do this we need to know a couple of simple commands that will help us control what we place in and take out of our online repository.

we make snapshots of the files using commit

git push - sed things to remote directory on git hub

git pull - sends files from remote to your working directory

git fetch - sends remote file to your local repository

git merge - moving and merging from local repository to working directory

concsol - communicate with R

terminal - communicate with Git and Git hub and quarto (the command promt)

command = git status
(in terminal)

- shows what is in the repository and what is commited and
- adding a *and then the file type (feks *.Rproj) allows you to igor all files of that type

read me file is added to the list of files and the file is opened in the editor. when writing in the README file git hub will convert it to a htlm file.

.md filending stands for markdown

**Disclaimer:** This section was written with the help of SIKT KI chat using the gpt-4o model. The AI was used to verify code chunks, summarize steps in an organized format and rewrite original text for better grammar and flow. The author takes full responsibility for the resulting output. Link to AI model.

## 3. Conducting Simulations Before Data Acquisition

## 4. Including Data Packages for Distribution

## 5. Creating Visualizations from Data Packages