

Jupyter Notebook + Google Colaboratory Instructions

This document provides instructions for generating designs using Jupyter Notebook (.ipynb) files hosted on Google Colaboratory (please note a google account is required). This allows you to run the code without the need to download or install any software. Please follow the instructions below.

Test Data

To follow the tutorial you should have downloaded the test files provided on the GitHub repo <https://github.com/ElleBowler/optimising-sample-designs>. (Please see the section “Running Jupyter demo files” in the documentation). Once downloaded, please save and unzip the folder in your chosen directory.

We will see how these files are used as we go through the notebooks, briefly we have:

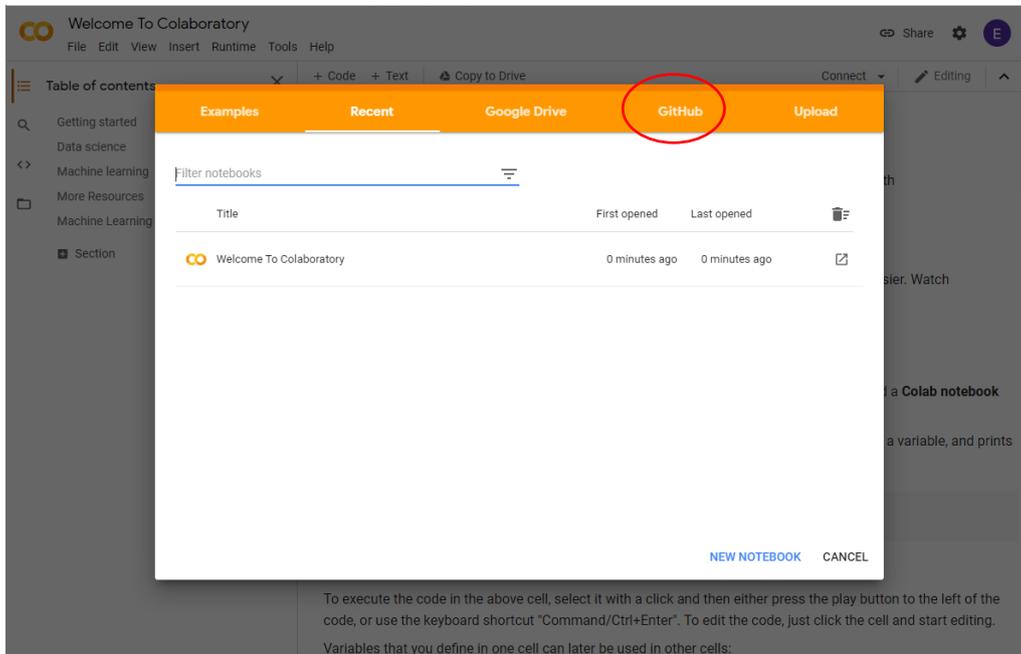
- *InvalidAreasMask.tif: A binary map showing valid (coded with 1) and invalid (coded with 0) areas in the landscape*
- *InvalidAreasMask_updated.tif: An updated version of InvalidAreasMask.tif, with extra invalid areas added. This is used to demonstrate adapting designs*
- *HabitatMap.tif: A two class habitat map (with non-habitat = 0, habitat = 1). This was used to generate the two fragmentation metric maps:*
 - *DistanceToEdgeLog2.tif: A log2 scaled distance to nearest habitat edge map*
 - *FragmentAreaLog10.tif: A log10 scaled fragment area map*

Please Note: All files are in georeferenced tiff format, and information on projection and resolution are used to output results in longitude/ latitude coordinates. This is important to know when inputting your own study site.

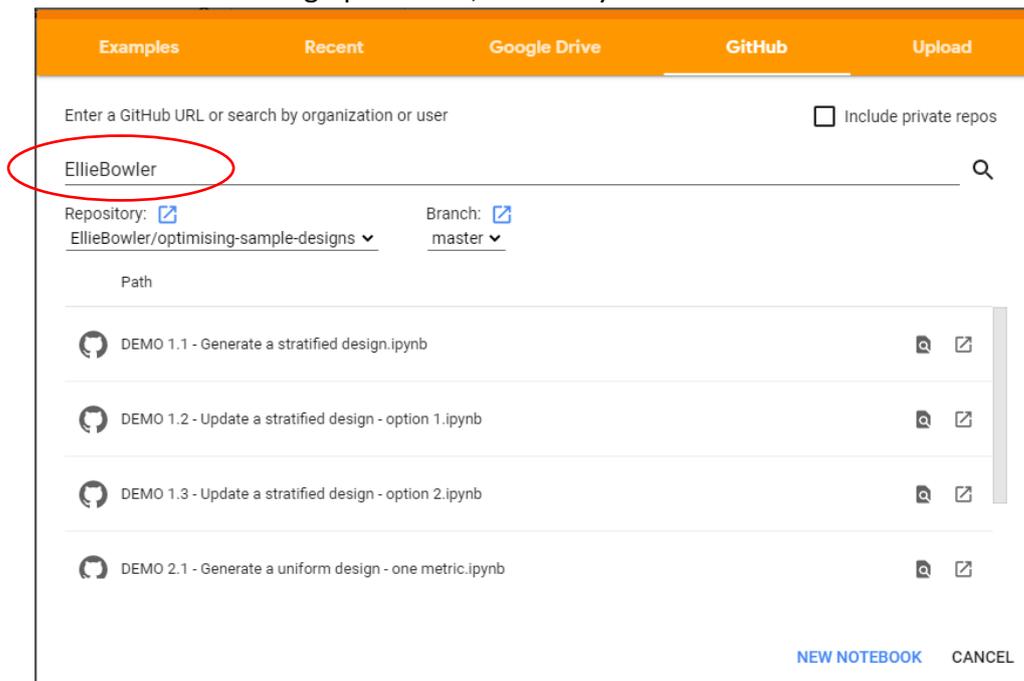
Google Colaboratory

Now we will open up our notebook files in Google Colaboratory. **Please Note:** It is best to use Google Chrome browser, and log in to your google account.

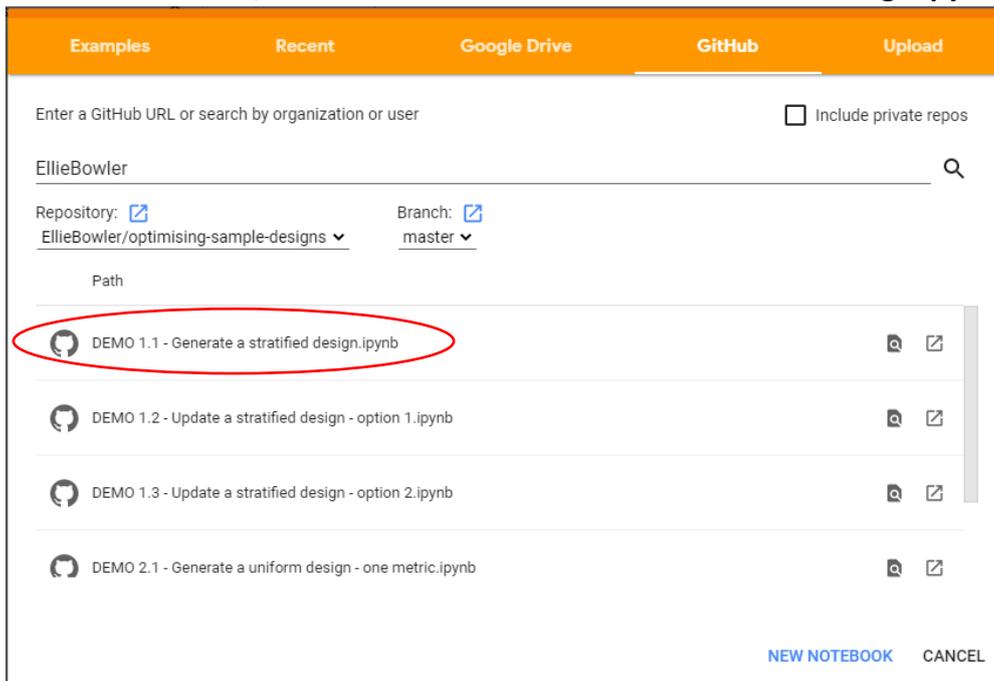
1. First open up Colab via this link: <https://colab.research.google.com/>
You should see the following pop up. Please click on the **GitHub tab**, circled in red.



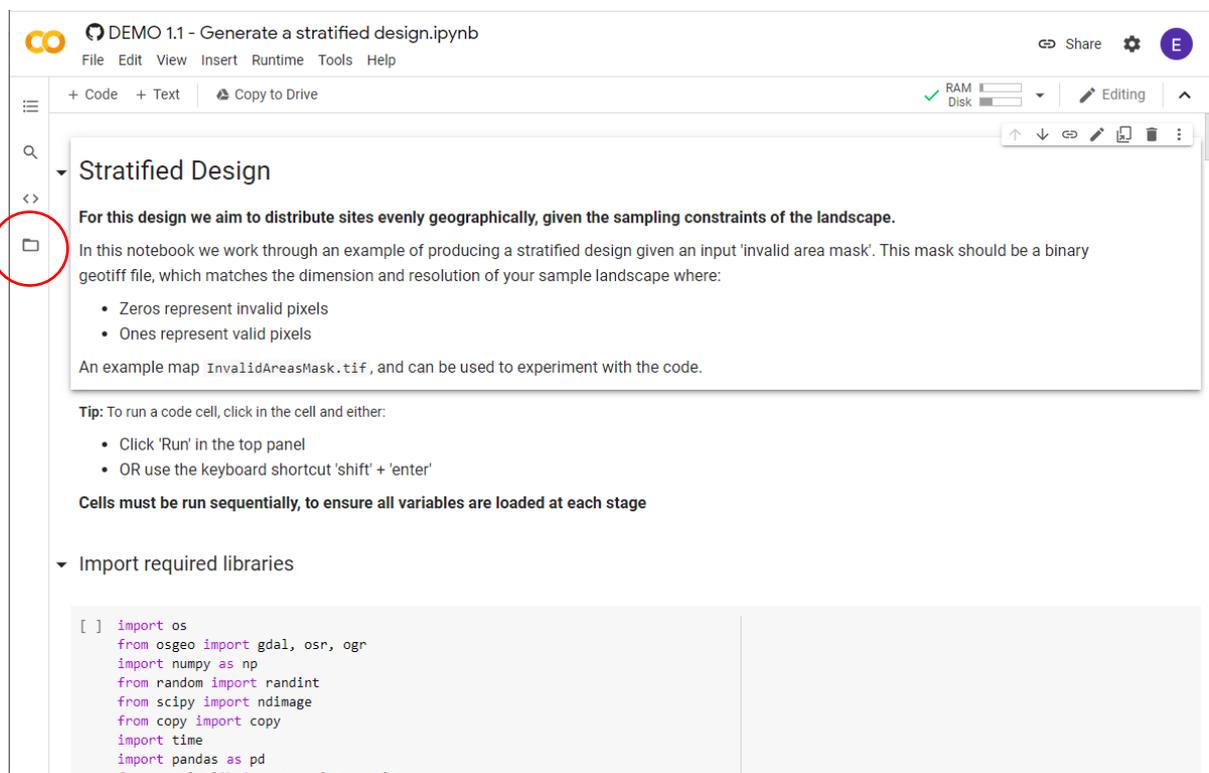
2. Under the top line 'Enter a GitHub URL or search by organization or user', enter the following github repo link <https://github.com/ElleBowler/optimising-sample-designs>. If this does not bring up the files, search by user instead with the name ElleBowler.



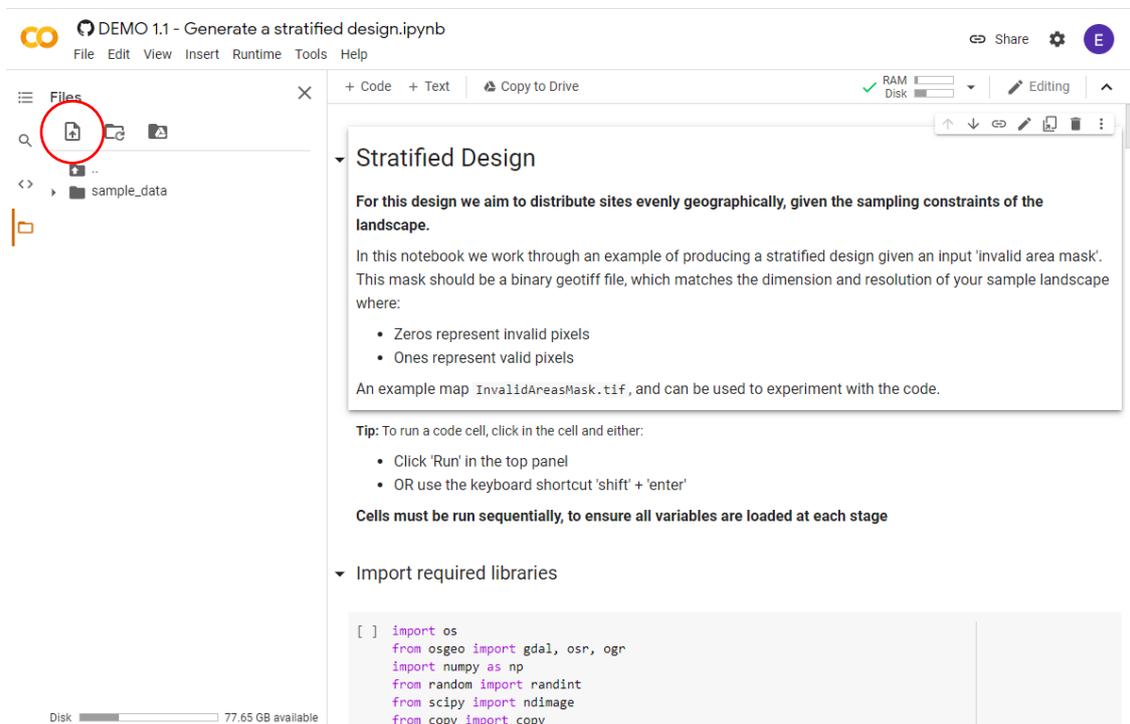
3. All jupyter notebooks (with file extension .ipynb) should appear listed as below. For this demonstration, **click on DEMO 1.1 – Generate a stratified design.ipynb**.



4. You should see the following page. This is the notebook for the Stratified Design. To run the code, we will need to **upload our test files**. To do this click on the folder symbol on the left of the notebook, circled in red.

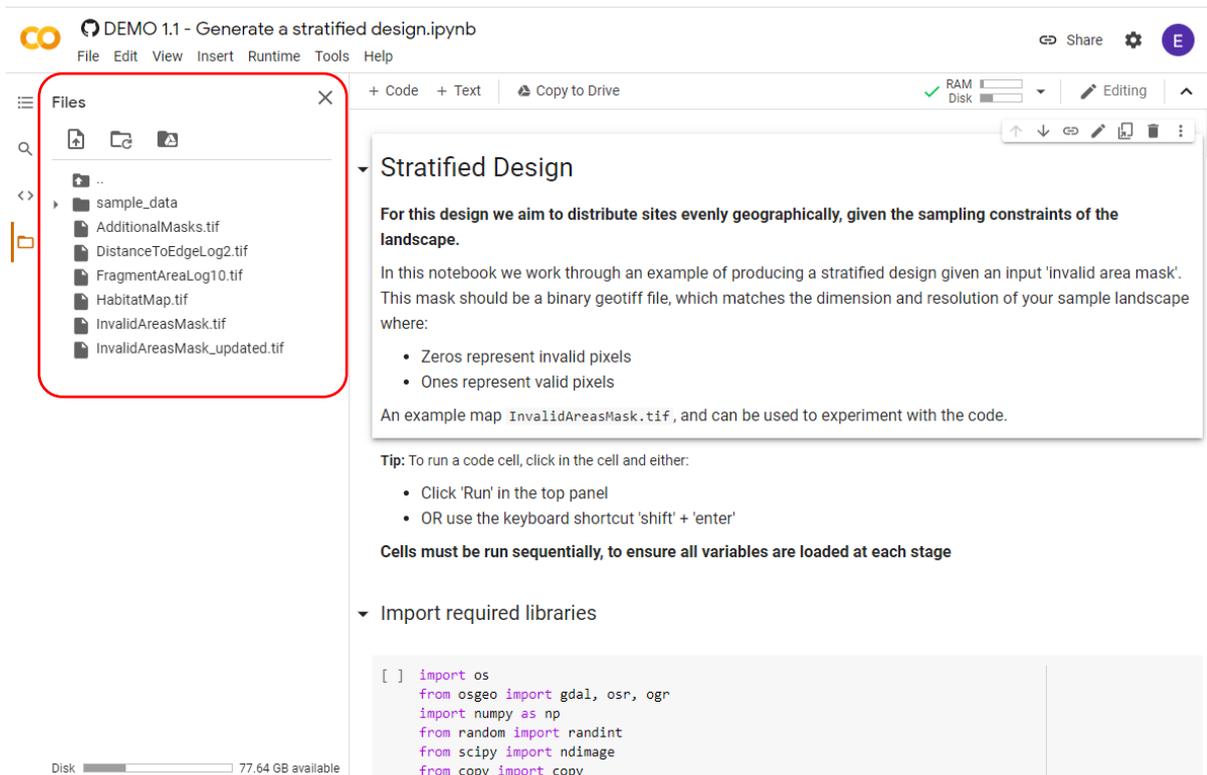


5. A panel will open with a 'sample_data' folder. From here **click on the upload files button** circled in red below.



The screenshot shows the Google Colaboratory interface for a notebook titled 'DEMO 1.1 - Generate a stratified design.ipynb'. The 'Files' panel on the left shows a folder named 'sample_data'. The upload button (a square with a plus sign) is circled in red. The main content area displays the notebook's text, including a title 'Stratified Design', an introduction, a list of bullet points (Zeros represent invalid pixels, Ones represent valid pixels), a tip about running code cells, and a code block for importing libraries.

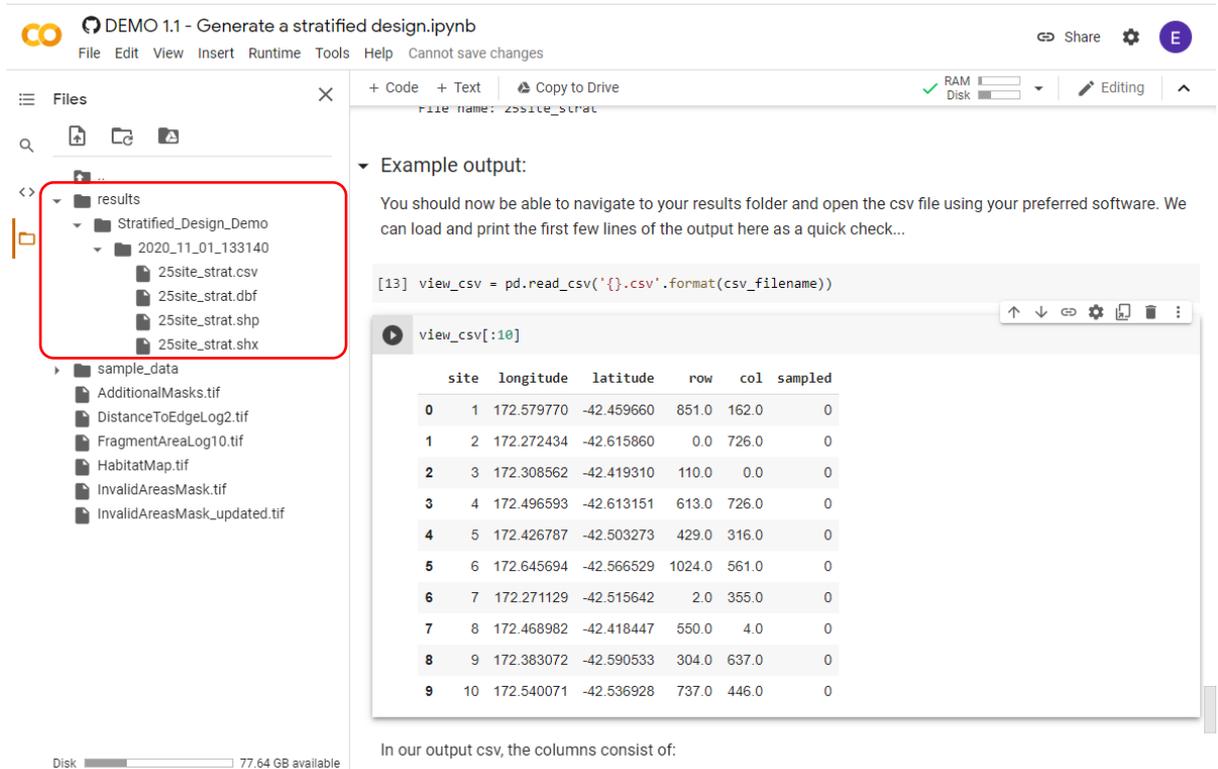
6. You can now **upload your files to Google Colaboratory**. Please copy all test files across, and **ensure they are in the same directory as the sample_data folder** as shown below.



The screenshot shows the Google Colaboratory interface with the 'Files' panel open. The panel lists several files: 'sample_data', 'AdditionalMasks.tif', 'DistanceToEdgeLog2.tif', 'FragmentAreaLog10.tif', 'HabitatMap.tif', 'InvalidAreasMask.tif', and 'InvalidAreasMask_updated.tif'. The 'sample_data' folder is highlighted with a red box. The main content area displays the notebook's text, including a title 'Stratified Design', an introduction, a list of bullet points (Zeros represent invalid pixels, Ones represent valid pixels), a tip about running code cells, and a code block for importing libraries.

7. You should now be able to run through the notebook!

Instructions are provided within the notebook, please run through each block sequentially. Your results will be generated and saved in a **results** folder, shown in the file panel. You can download these directly from colab and view them in your chosen software.



The screenshot shows a Jupyter Notebook interface. On the left, a file explorer panel displays a directory structure. A red box highlights the 'results' folder, which contains a sub-folder 'Stratified_Design_Demo'. Inside this sub-folder, there is another sub-folder '2020_11_01_133140' containing four files: '25site_strat.csv', '25site_strat.dbf', '25site_strat.shp', and '25site_strat.shx'. Below this, there is a 'sample_data' folder containing several .tif files.

The main notebook area shows a code cell with the following code:

```
[13] view_csv = pd.read_csv('{}'.format(csv_filename))
```

The output of the code cell is a table with 10 rows and 7 columns. The columns are labeled 'site', 'longitude', 'latitude', 'row', 'col', and 'sampled'. The data is as follows:

	site	longitude	latitude	row	col	sampled
0	1	172.579770	-42.459660	851.0	162.0	0
1	2	172.272434	-42.615860	0.0	726.0	0
2	3	172.308562	-42.419310	110.0	0.0	0
3	4	172.496593	-42.613151	613.0	726.0	0
4	5	172.426787	-42.503273	429.0	316.0	0
5	6	172.645694	-42.566529	1024.0	561.0	0
6	7	172.271129	-42.515642	2.0	355.0	0
7	8	172.468982	-42.418447	550.0	4.0	0
8	9	172.383072	-42.590533	304.0	637.0	0
9	10	172.540071	-42.536928	737.0	446.0	0

Below the table, the text reads: "In our output csv, the columns consist of:"

Once you're happy - test out uploading your own data to generate designs for your study site!