BIDSit is a program that will convert DICOM and PAR/REC files into NIfTI files via 'dcm2niiX'. **BIDSit** then reorganizes the outputted data into the proper naming and folder structure convention for Brain Image Data Structure (BIDS). User-friendly graphic user interfaces (GUIs), supported by 'PySimpleGUI,' makes using **BIDSit** quick and easy.

Getting Started:
Most required programs are installed using pip or via setup.py on install. See [GitHub](#) for installation instructions. The 'dcm2niiX' application converts the raw DICOMs files to NIfTI files. 'dcm2niiX' is downloaded with MRIcroGL's graphical interface. Download 'dcm2niiX' [here](#).

After installation, to run **BIDSit** from the command line, use the following command:

```
BIDSit
```

1. The **BIDSit** window will open (Figure 1).
2. To begin, select the directory that contains the subject folders that house the data to convert. The data can be DICOMs, PAR/REC, or previously converted NIfTI files (see Figure 2). This is the input directory.
3. Then, either select a folder (directory) that will house the output folder ('*/sourcedata/*' or '*/rawdata/*' and '*/derivatives/*'). Alternatively, if left blank, the output will be in the parent directory of the previously selected. This is the output directory.
4. If the data is either DICOMs or PAR/REC files, it must be converted to NIfTI files prior to BIDS conversion; select 'Convert to NIfTI.' **BIDSit** uses 'dcm2niiX' for conversion.
5. Select the 'Put NIfTI into BIDS format' option if the data is NIfTI files or the 'Convert to NIfTI' option has also been selected.
6. If the dataset contains sessions (i.e. more than one time point for each participant), select yes from the sessions dropdown menu
7. **BIDSit** currently supports functional, anatomical, diffusion-weighted, and fieldmap images. Select which images are in the dataset.
8. Press 'Go'!
9. If converting from DICOM or PAR/REC and would like to save a copy of the unedited NIfTI files in the parent directory, select 'Yes' to save a copy.

Data Specification:
BIDSit requires some user-provided information to sort through the NIfTI files and rename them correctly. To specify the naming conventions for each file type (see below for fmap and func modifications):

1. A new window will open to specify information about the scans (Figure 3). Each file type selected on the first **BIDSit** window will have a tab to specify information for that scan type.
2. The first input in a file type tab is to specify the number of *types* of scans or tasks (for func data).
   ⇒ i.e. if looking at structural scans in the 'anat' tab, if the data contains T1w and T2w scans, then that would be 2 scan types
3. The second input is for the *total* number of scans.

> ⇒ i.e. if the data had one T1w scan and then a T2w scan at the start and at the end of the session, there would be a total of 3 scans (1 T1w + 2 T2w)
>
> ⇒ i.e. for functional scans, if the data has 3 tasks that each repeat twice, there would be a total of 6 scans (3 tasks x 2 repetitions)

4. After supplying the number of scans, then specify timing information about these scans. This information will sort the data and allow the correct files to be selected and renamed. Do so by clicking the 'Specify Scan Order' button.

5. The 'Specify Scan Order' button will open a second window specific to the scan type and the number of scans specified. Then, specify what kind of scans were collected from the dropdown menus.

6. Next, specify the order in which the scans were taken. To do so, for each row select which scan type was taken (the first row is equivalent to the first scanning time point of this scan type).

> ⇒ i.e. in the anatomical example, the first anatomical scan was a T2w, then a T1w, then, later in the session, the second T2w (see Figure 4). This is indicated by the order from right to left in the red box of Figure 4.
>
> ⇒ i.e. if there is only one scan type, click all indicators to specify scans occurring in order over time (see Figure 5).

7. Then, specify any BIDS entities for each scan based on the timing information above. Finally, select which scans an entity will be applied to on the right side. <u>Note</u>: these fields do not need to be filled in; input the required information to distinguish between scans that would not be otherwise distinguishable.

> ⇒ i.e. Scan 1 would be the first T2w, Scan 2 would be the T1w, and Scan 3 would be the final T2w (see Figure 2), with the descriptions applying to the first and third scans.
>
> ⇒ i.e. func scans will have run and echo numbers filled in without any additional user input from the BIDS entities. However, this information can still be included.

8. Once complete, press 'Go'!

9. Repeat the above steps for each tab.

10. Press 'Go' to BIDSit!

11. **BIDSit** will save a copy of the inputted information into a .json file in a folder named '*/BIDSit/info/*' in the output directory specified. Which can be loaded in for future runs of BIDSit.

Functional images:

Functional images are slightly different as they are named using run information. For functional scans, in addition to providing the task order, provide a name for each of the tasks. **BIDSit** supports the BIDS classification of multi-echo data. Select 'yes' from the dropdown menu on the file type tab for 'func' data, then enter the number of echoes for each task. If some tasks are multi-echo and some are single-echo, simply enter the number 1 for single-echo tasks.

Fieldmap images:

The Fieldmap tab must be filled out last to have all the necessary previous information from other scan types. Like other scan types, provide the number of types of fieldmap scans. It is important to count each direction (i.e. blip-up and blip-down scans) as separate scan types. Before specifying the scan order, indicate which scans the fmap is 'intended for,' which will be included in the .json

file for the scan. This can be done through the menu on the right side after specifying the scan type. Click 'info' for more information about the BIDS definitions of scan types.

Load:
We have included a load function to reduce re-entry errors and save users time and effort. After the first instance of running **BIDSit** on the data, future data can be run using the same inputs via the load function. Once the Data Specification GUI opens, click 'Load', and locate the file corresponding to the user inputs in the '*/BIDSit/info*' folder in the previous output location.

Check your data!
BIDSit will output a "*/BIDSit/change_log.json*' for each scan in each scan type. This file will provide the original name of the NIfTI file (either after conversion by dcm2niiX or provided by the user) and the updated name by **BIDSit** for each scan. It is imperative to ensure that these files have been converted correctly. Further confirmation of scan types can be obtained by investigating the .json files for each scan.
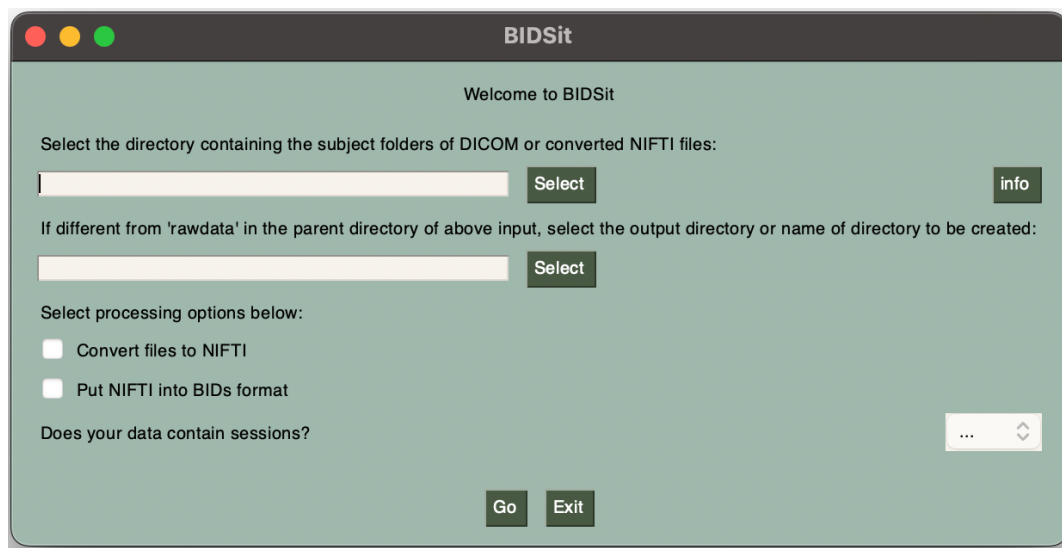
Figure 1: The BIDSit window upon first opening
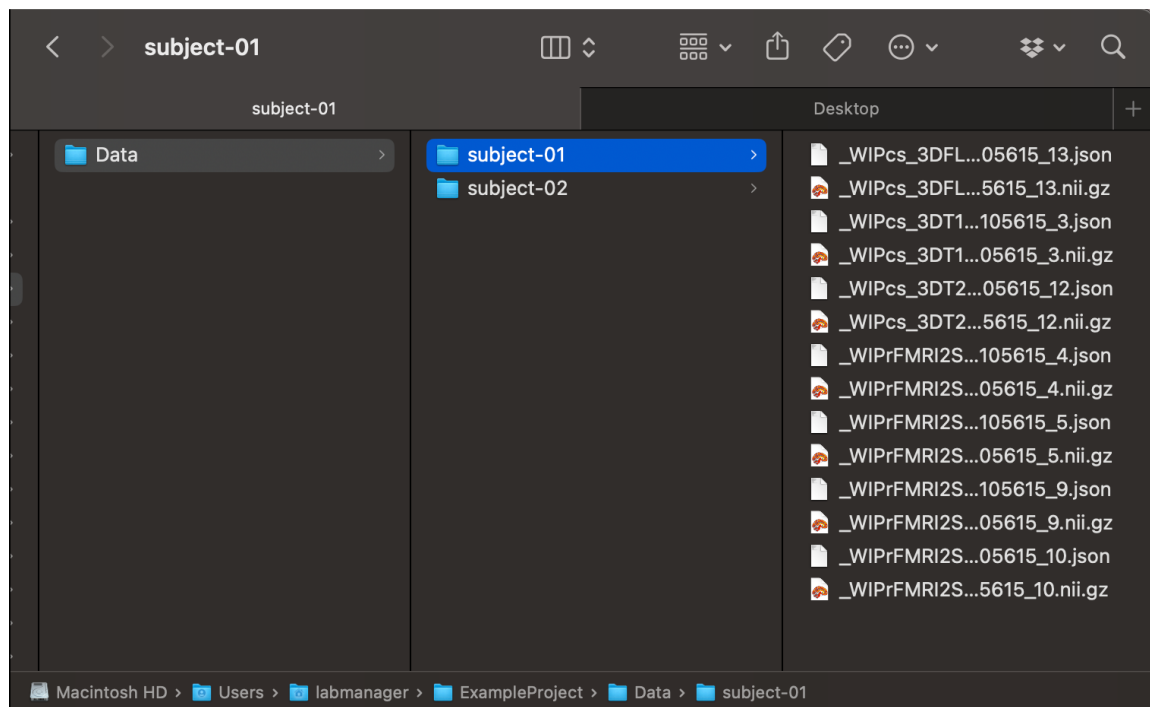
Figure 2: This is an example data structure before BIDSit conversion. The input directory would be `/Users/labmanager/ExampleProject/Data`. Unless otherwise specified by user input, the output directory would be `/Users/labmanager/ExampleProject`.
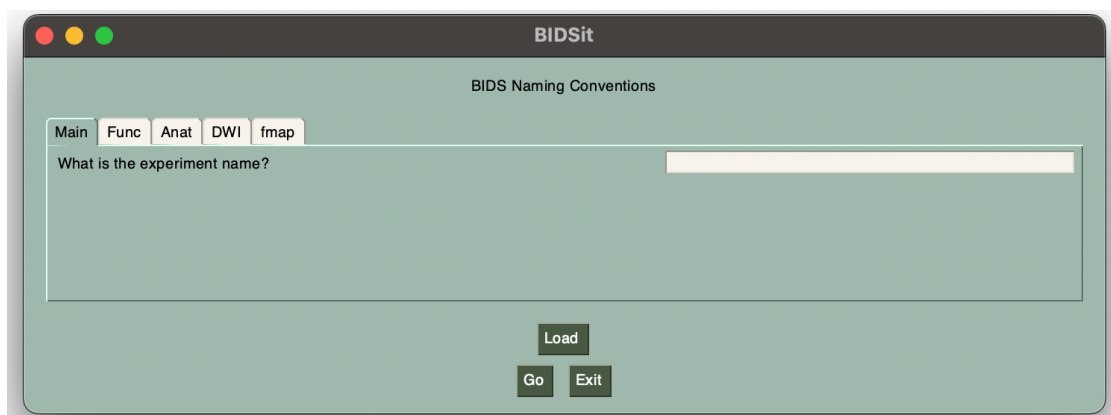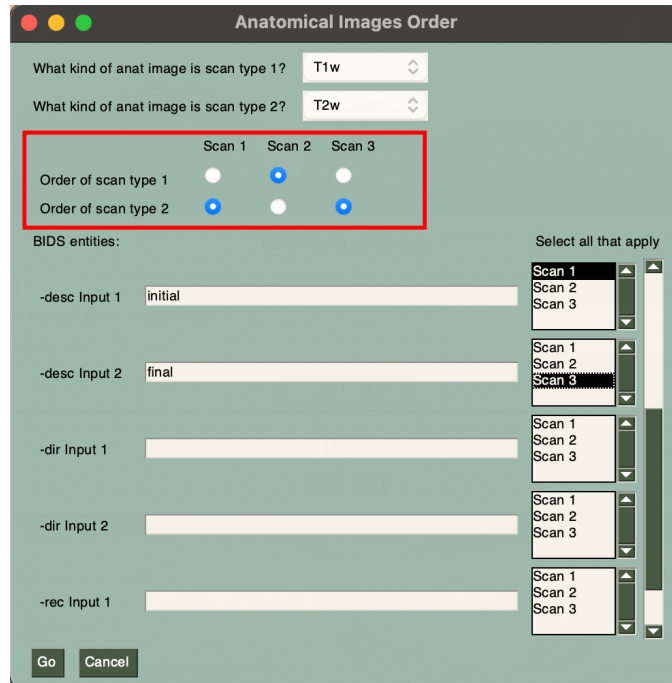

Figure 3: BIDSit file information user face.
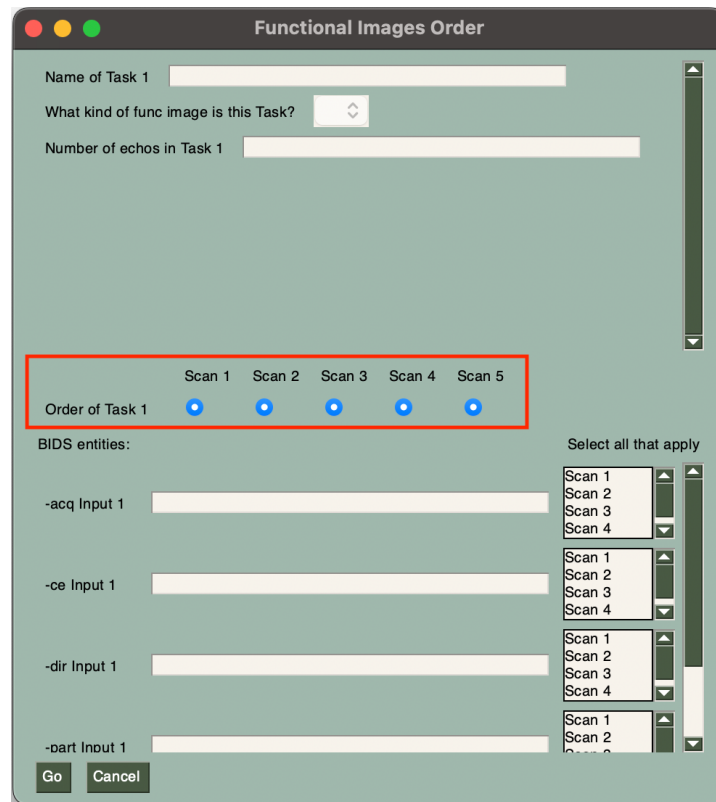
Figure 4: Anatomical scan example with 2 scan types (T1w and T2w), 3 anatomical scans total. The scans occurred in the following order T2w, T1w and finally T2w, indicated by the order of each scan type (each row indicating a timepoint). The description has been used to distinguish between the T2w scans, such that the naming of the files would contain 'desc-initial' and 'desc-final' for scans 1 and 3, respectively.

Figure 5: An example of a session with only one functional scan task. The task repeats 5 times over the scanning session.