

Converting MRI data into the BIDS data structure format

BrainData.fi

What is BIDS? Why should I use it?

[BIDS](#) (Brain Imaging Data Structure) is a standardized format for organizing and describing neuroimaging datasets to promote re-use of both data and code. BIDS defines a specific [directory structure](#) and a precise file naming schema, which are described in the [BIDS specification](#). BIDS supports several imaging modalities including functional and structural MRI, MEG, EEG, and iEEG.

BIDS formatted MRI data is stored in the NifTI file format and each data file is paired with a JSON sidecar file that contains information about the scan. MEG and EEG data are stored in the scanner manufacturer's file format along with JSON sidecars and modality specific metadata files. In addition to data files and accompanying descriptor sidecars, BIDS incorporates modality agnostic files that describe the dataset and provide phenotypical information about the participants in a standardized format.

Adopting the BIDS standard has multiple benefits. Anyone who is familiar with the standard can easily work on any BIDS formatted dataset without extensive familiarization, which simplifies co-operation between researchers from different labs and even within the same lab over time. The [BIDS Validator](#) can be utilized to verify data integrity and compliance with the standard. BIDS compliant datasets can be processed using [BIDS Apps](#), software packages that employ a common set of command line arguments. Moreover, neuroimaging databases such as BrainData.fi and OpenNeuro.org only accept datasets that adhere to BIDS.

Convert your DICOM data into BIDS using BIDScoin

Why do I need to convert my data?

MRI data and metadata are stored in the NifTI and JSON file formats in the database, respectively. However, MRI scanners typically output data in either DICOM or PAR/REC format and the directory structure and file naming schema depend on the scanner manufacturer and software configuration. Therefore, raw scanner output must be converted into NifTI and organized according to the BIDS standard to form a valid BIDS dataset. The conversion can be accomplished manually, utilizing the [dcm2niix](#) DICOM-NifTI converter and organizing the files by hand, as described in [this tutorial](#). However, the preferred approach is to exploit an automated conversion tool. While [several other open-source tools](#) exist, this guide focuses on [BIDScoin](#), a toolkit developed at the Donders Institute.

What is BIDScoin?

BIDScoin is an open-source toolkit developed for the purpose of converting MRI datasets into BIDS. BIDScoin is easy to use and does not require any programming skills. The toolkit combines metadata extracted from data file headers with knowledge of the user. The toolkit consists of three separate elements. The *bidsmapper* creates a mapping (bidsmap) from the organization of the raw data to

BIDS. The mapping is then edited by the researcher using *bidseditor*, an interactive graphical user interface. Finally, the *bidscoiner* consumes the bidsmap and leverages *dcm2niix* to convert the data into BIDS. Installation instructions and usage examples are found in the [documentation](#). Note that you should add the BIDScoin script path to your PATH environment variable. Consult your organization's ITS if you require assistance. We also recommend working through the official [tutorial](#).

How do I prepare my data?

MRI scanners might organize the source data in different ways depending on the manufacturer and the software configuration. BIDScoin requires the source data be organized in subject and session level folders, named with BIDS-like subject and session identifiers (sub-identifier/[ses-identifier]/data). Individual data folders may be organized in either seriesfolder, DICOMDIR, flat DICOM or PAR/REC organization. Details are available in the [documentation](#).

Creating and editing the bidsmap

The bidsmap is a mapping representation of the data, describing how the data should be converted into BIDS. The bidsmap is generated using the *bidsmapper* command line tool, in the simplest form:

```
bidsmapper sourcefolder bidsfolder
```

This command generates the bidsmap using the default template and places it in `bidsfolder/code/bidscoin`. The *bidseditor* GUI is launched automatically, allowing you to complete the mapping with study-specific knowledge. The main window shows an example of each type of DICOM filename pattern, and the mapping in BIDS. Valid mappings are shown in green and incomplete mappings are shown in red. You must complete each incomplete mapping by double clicking the filename and filling in the missing information. Notably, you should check the *dcm2niix* path on the options tab of *bidseditor* and update it with the path of your *dcm2niix* executable. Any scans that you do not want to include in the BIDS dataset should be assigned to `leave_out`. Read more about optional functionality of *bidsmapper* and *bidseditor* in the [documentation](#).

Bidsmapper utilizes a template [bidsmap](#) to create the initial unedited mapping. Depending on the scanner output, completing the mapping in *bidseditor* might involve considerable work. Therefore, it is advisable to consider preparing a site-specific [bidsmap template](#).

Running bidscoiner

Converting the data with *bidscoiner* is straightforward once the bidsmap has been customized for the study using *bidseditor*. Simply run the command:

```
bidscoiner sourcefolder bidsfolder
```

To view all available options, run `bidscoiner -h`.

Final touches

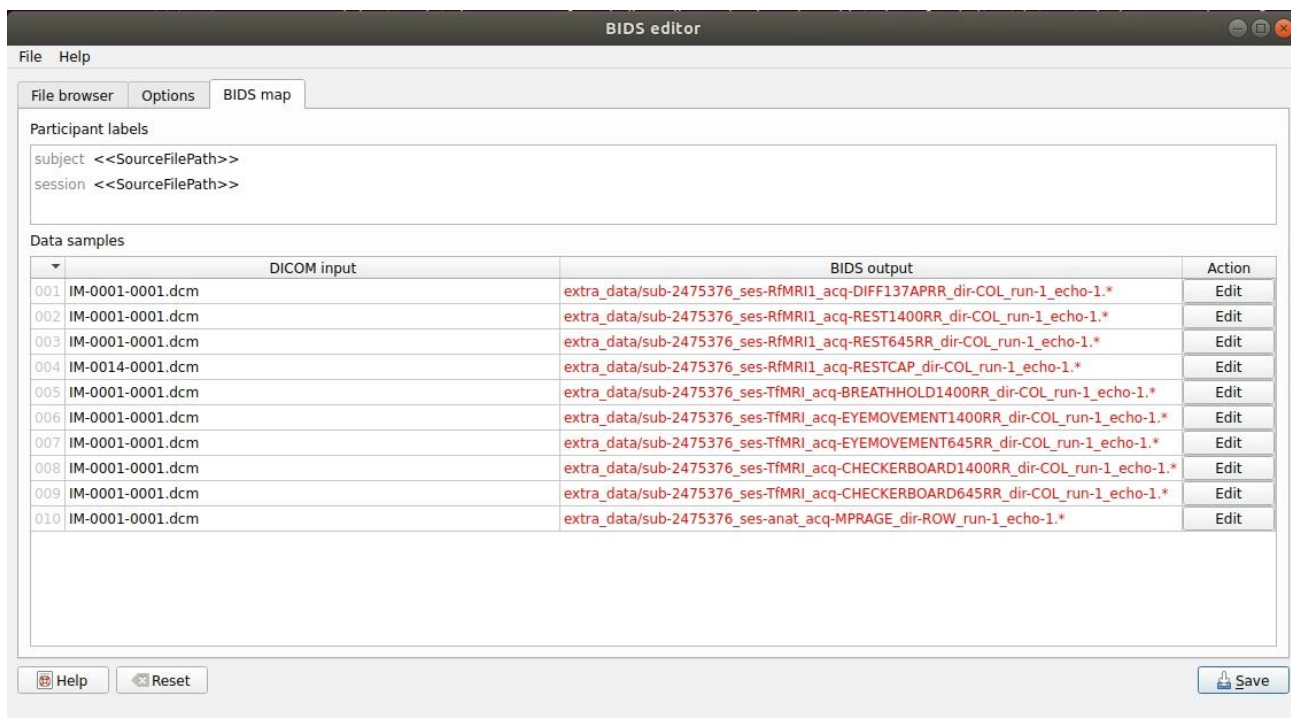
In addition to the imaging data and associated metadata, BIDS datasets contain a formalized description of the dataset and participants. Therefore, you should complete the generated template `dataset_description.json`, `participants.json`, `participants.tsv`, and `README` files with study-specific information. Recommended fields are described in the [BIDS specification](#).

It is recommended to update the JSON sidecar files of each scan with relevant metadata that was not included in the DICOM headers. The files can be modified with any text editor, or in bulk using, for example, [sed](#). Recommended fields are listed in the [BIDS specification](#).

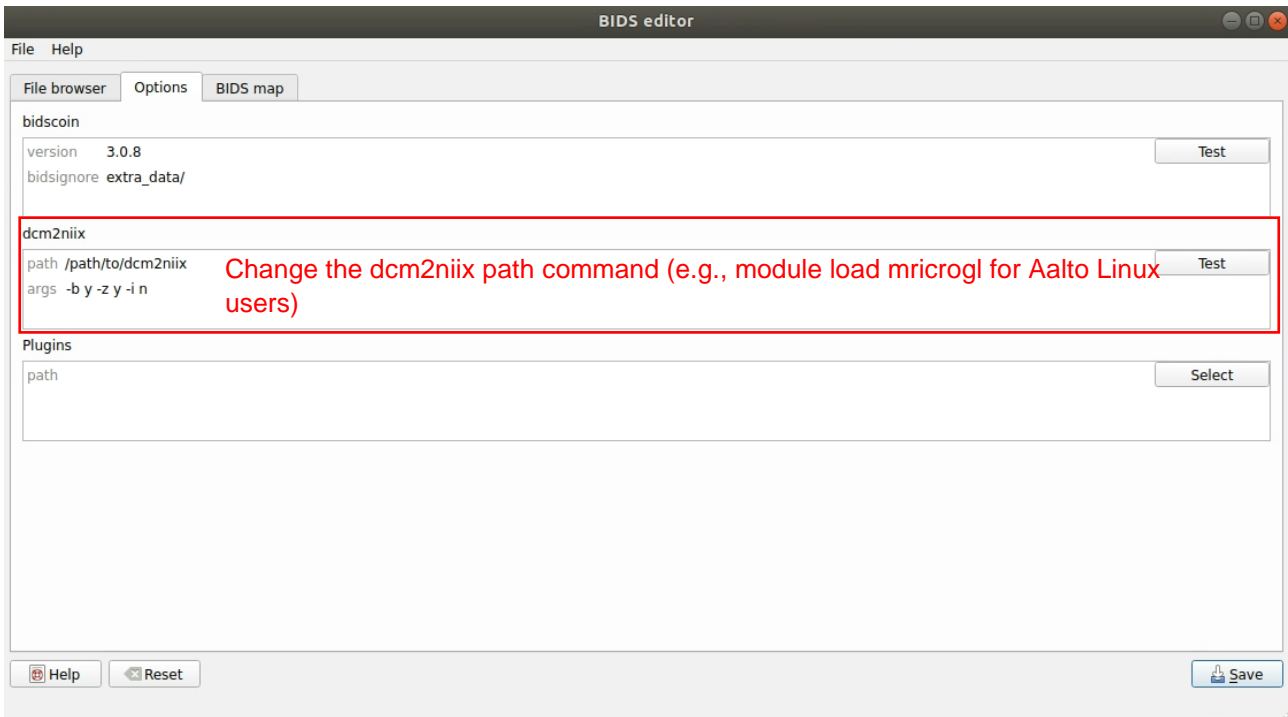
Finally, once all steps have been completed, the BIDS dataset should be validated. We recommend using the online [BIDS Validator](#), which scans the dataset and displays potential errors. The dataset must pass BIDS validation before it can be accepted into the BrainData database.

Images:

BIDS editor main window



BIDS editor options tab



BIDS editor mapping edit window

