User Manual

Python Recording Aid

Contents

1 Introduction

Imaging guided access to the brain has become a routine procedure for various research and clinical applications, including drug administration, neurophysiological recording, and sampling tissue. Python Recording Aid (PyRecAid) is an open-source tool designed to automate accessing the area of interest in brain.

The software supports both Dicom and Nifti image format as input and provides processing procedures including reslicing, flipping, adding chamber, and coregistration in an automated manner.

2 Installation

To Install the software first clone the repository from here and follow the bellow steps:

- **Python:** We recommend to use anaconda to create new environment and install dependencies. Python 3.6 is required to execute the software files.

- **Dependencies:** A yaml file is provided in the repository including required packages. Otherwise, the package installation guide is provided in the README and they could be installed manually.

- **Running the software:** After installing packages, activate the environment and the run the main.py file.

3 Main Menu

This menu contain tools to show the 3d images, reslice it, add chamber, and flip it if required. In the following sections we express each part by details:

3.1 Loading Image Folder

Using **Load Folder** button, the series directory is selected. If there exist image series inside the selected directory, the list of existing series will be showed as shown in figure 1.
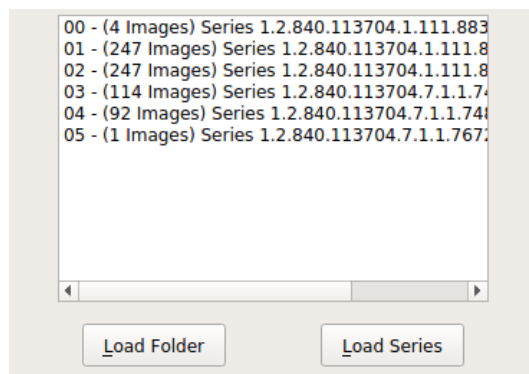


```
00 - (4 Images) Series 1.2.840.113704.1.111.883
01 - (247 Images) Series 1.2.840.113704.1.111.8
02 - (247 Images) Series 1.2.840.113704.1.111.8
03 - (114 Images) Series 1.2.840.113704.7.1.1.74
04 - (92 Images) Series 1.2.840.113704.7.1.1.748
05 - (1 Images) Series 1.2.840.113704.7.1.1.7672
```

Load Folder   Load Series

Figure 1: Series List

3.2 Load Series

After loading all images inside directory, you need to select the desired series and then press **Load Series** button. Then the loaded series is showed in main window as figure 2. As it is observable, images contain the the slice distances in milimeters. Three slices including Horizontal, Sagittal, and Coronal are showed. By moving the mouse scroll on each slice, the whole brain could be covered.
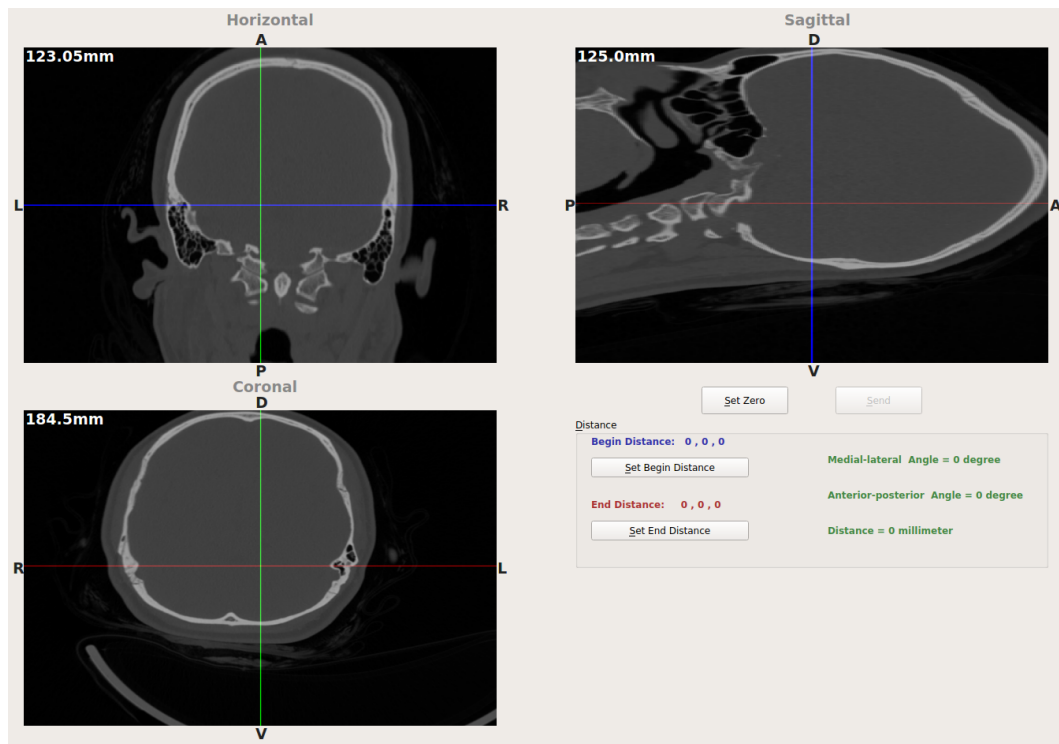
Figure 2: Loaded Series

3.3 Enabling Extra Options

To enable reslice, add chamber, and flip the tools menu should be opened from the upper bar of frame. Then, by pressing each option the related window will be shown on the side bar of main window (figure 3)
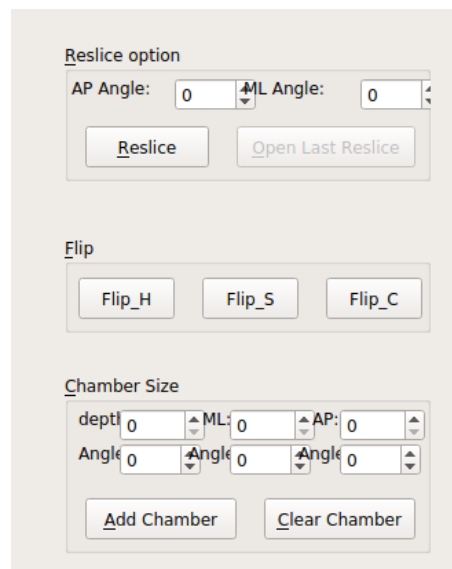

Figure 3: Extra Options

3.4 Reslice

This tool is used to reslice the brain by specifying AP and ML angles. Both angles ranges are from -180 to 180 degrees. To reslice the brain, both angles should be determined first, then by pressing **Reslice** button a new window with resliced series is shown as figure 4.
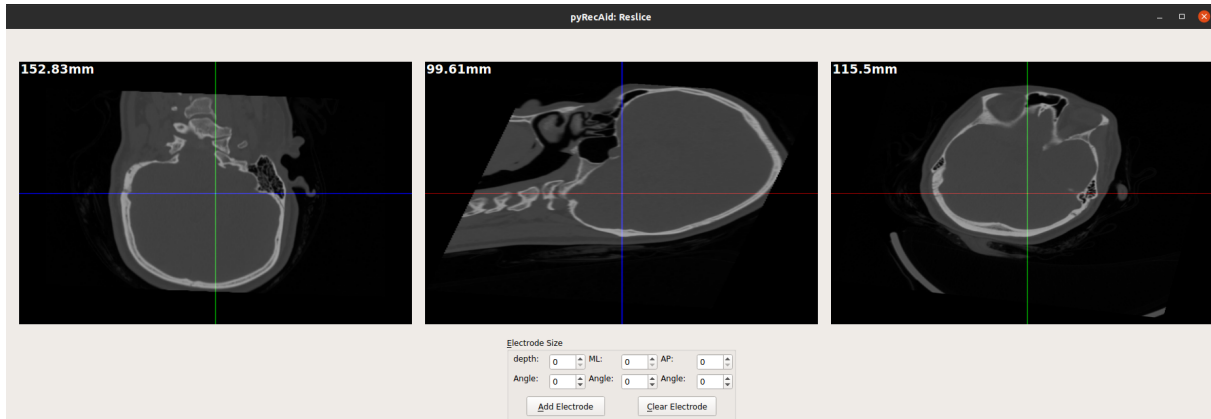

Figure 4: Reslice Window

3.5 Add Electrode(Chamber)

Adding an electrode to the brain is one of the options that is provided in both resliced and main menu. As shown in figure 5, an electrode is added in the reslice window by setting required parameters. These parameters could be defined in the **Electrode Size (Chamber Size)** window (figure 6).
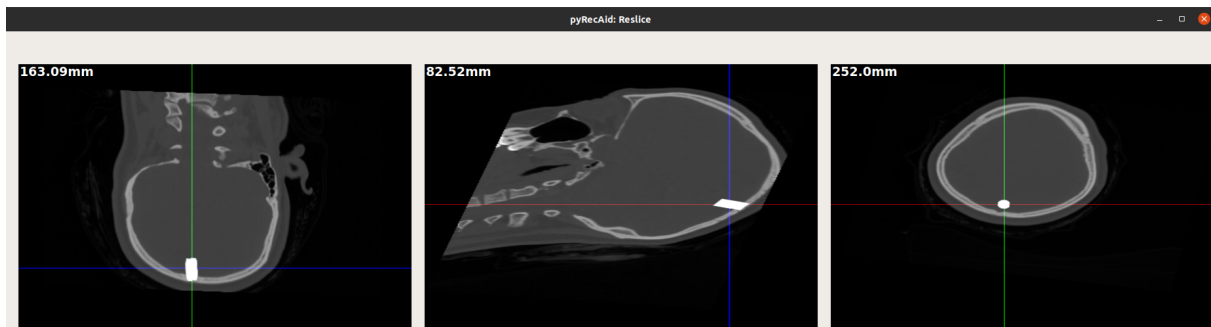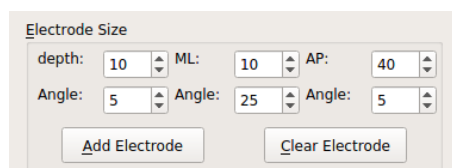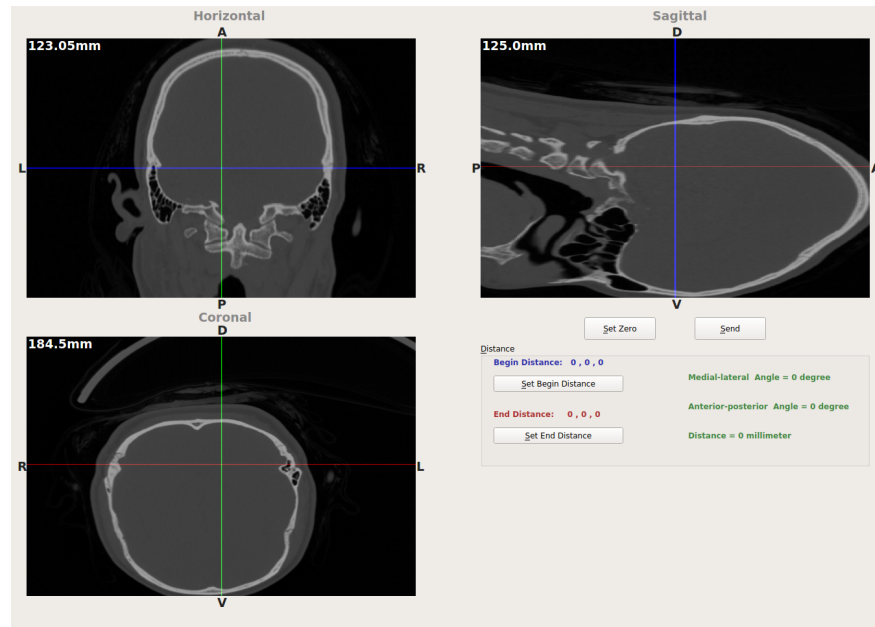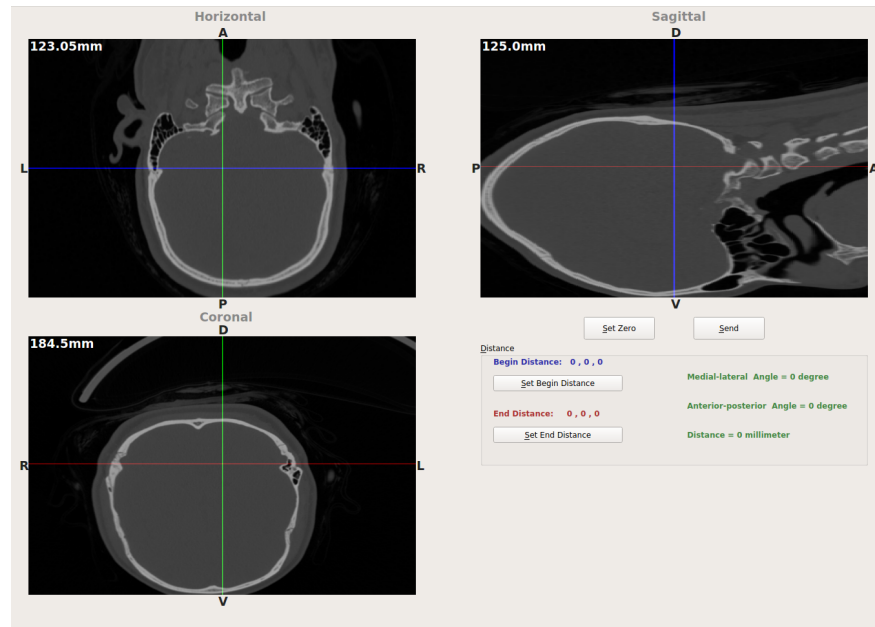

Figure 5: Adding Electrode

Figure 6: Electrode Size

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3.6 Flip Menu

This menu is very handy when the slices are not shown in right Directions. If the directions of head in series are not as desired, then by flipping them they could be put in right directions. As a case in point, Sagittal view is flipped as shown in figure 7.

(a)

(b)

Figure 7: Flipped images

4 Coregistration Menu

This menu is accessible from both main window by pressing **Coregistration** button, or opening from tools bar. The coregistration window is shown in figure 8. As it is observable, there are three rows for three series. The first and second series are the two series we intend to register. Consequently, the third row is for result series, which is the combination both first and second series. Loading the series is quite similar to the main window.
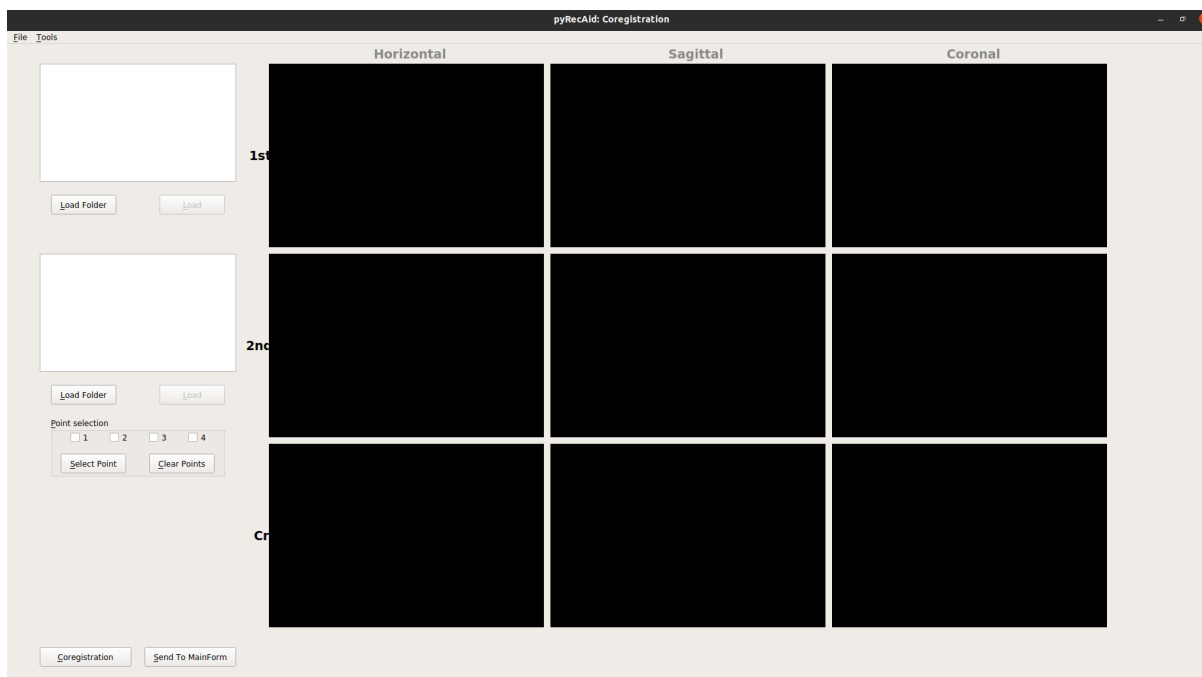

Figure 8: Coregistration Menu

After loading both series, four match points are required to register both series. As the utilized algorithm is based on 3D affine transformation, at least one of the four match points should be on a different slice (not all of four points on a same plane). Point selection window is designed for this purpose as shown in figure 9. Points could be selected by setting the coordinates on both images by mouse scroll and the pressing **Select Point** button. By selecting each point, a check mark will appear in each box related to the point. If the user wants to clear points, it could be done by pressing **Clear Points** button. If a single point is to be cleared, then the user should clear the check mark of corresponding point.
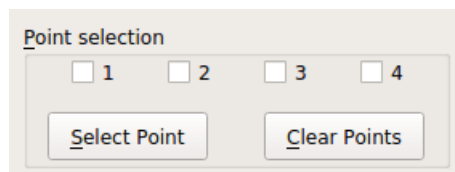

Figure 9: Point Selection

4.1 Flip and Swap options

If the series are not in the same directions, then the user could change it to the right order by using **Flip** or **Swap** buttons. Before using this tools, the related series should be chosen and then the transformation could be applied

(figure 10). These option could be enabled or disabled from tools bar. Two series should be in a same direction in order to reach a suitable coregistration.
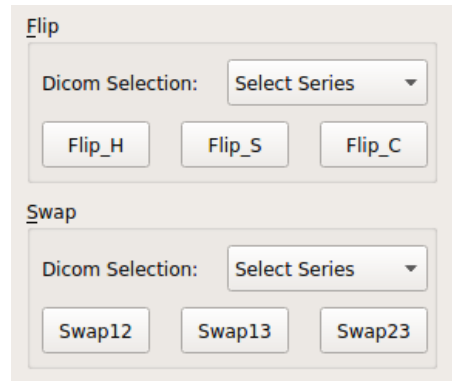

Figure 10: Point Selection

4.2 Send to Main Form

After applying coregistration on series, the result could be sent to the main window by pressing **Send To Main Form** button. In the main window, the series are available for reslicing or adding chamber.

5 Some usable notes

- Each slice could be maximized by double clicking on it.