Tutorial for Working with EEGsig

EEGsig open source toolbox for end-to-end EEG signal processing

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Abstract

In the quest to realize EEG signal processing toolbox, in this paper, we demonstrate the first toolbox contain three state of EEG signal processing (per-processing , feature extraction , classification) together. Our goal is to provide a comprehensive toolbox for EEG signal processing. Using MATLAB software, we have developed an open source toolbox for end-to-end processing of the EEG signal. As we know, in many research work in the field of neuroscience and EEG signal processing, we first clear the signal and remove noise, artifact, etc. Which we know as per-processing, and then extract the feature from the relevant signal, and finally Machine learning classifiers used in this study to classification of signal. We have tried to provide all the above steps in the form of EEGsig as graphical user interface(GUI) so that there is no need for programming for all the above steps and reduce the time to complete these projects to a desirable level.

Index Terms

EEG, signal processing, Matlab, neuroscience, machine learning, open source, toolbox.

How to use EEGsig for pre-processing and feature extraction?

- **First run the EEG.mat file with MATLAB software**

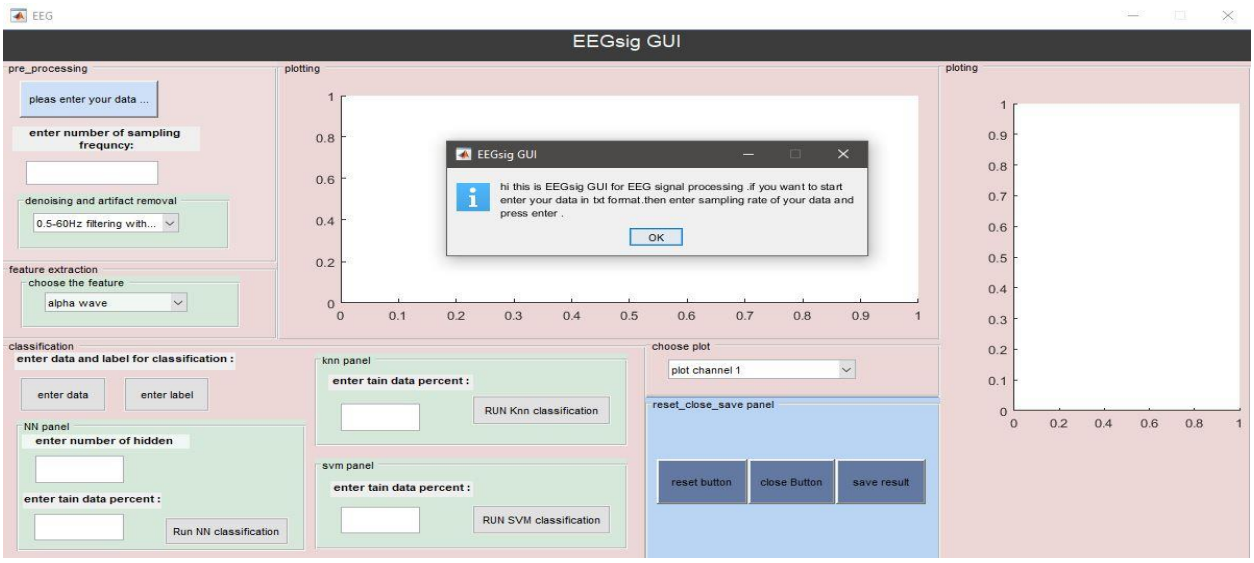

Figure 1 .After running EEG.mat, the software is run and we see the following image

- **Now in this step we have to load the desired data in EEGsig**

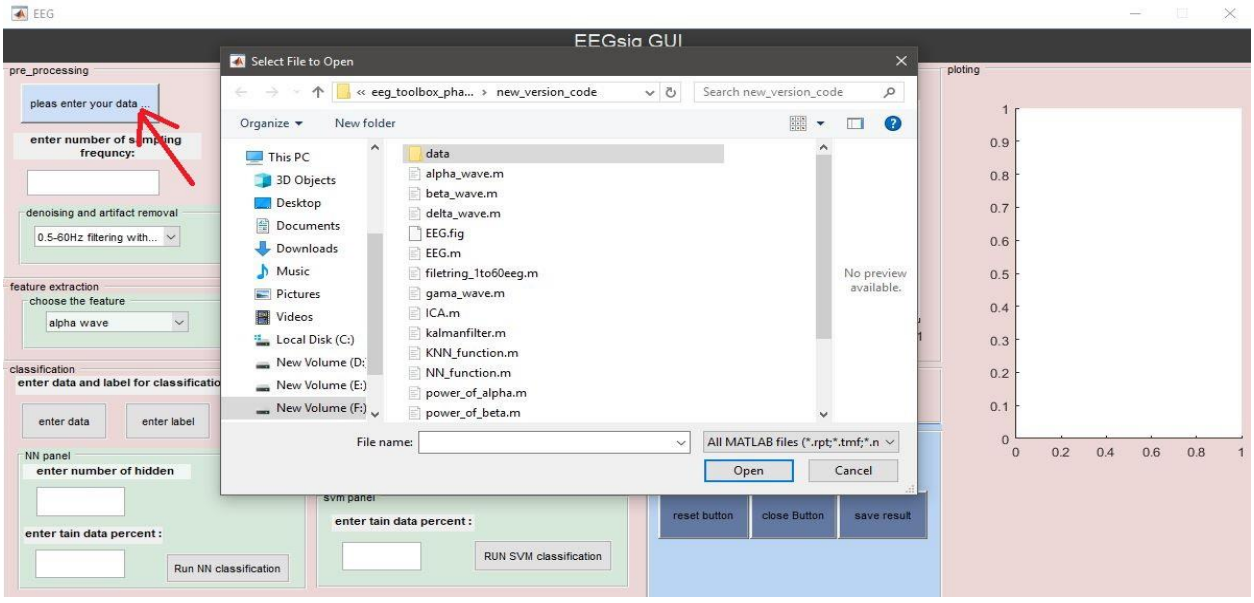

Figure 2 .To load the data, press the button marked with a red arrow

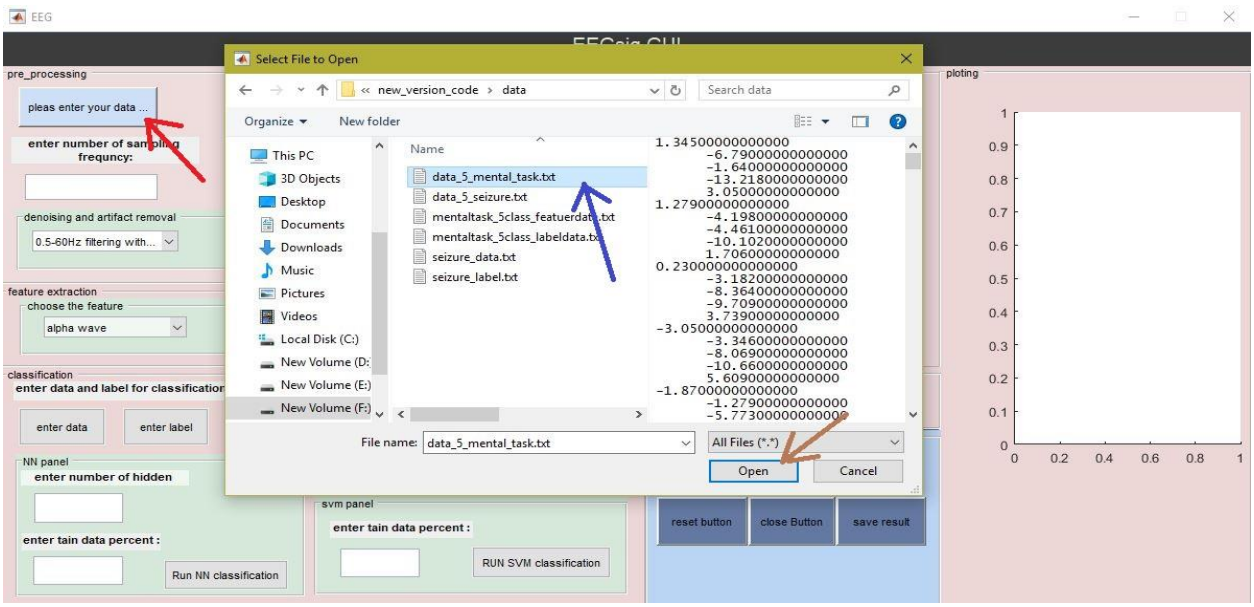

Figure 3 .Then we load the desired data from the data folder

Figure 4 . Our data is then displayed automatically

- **Then it is time to enter the sampling frequency**

It is important to note that since the frequency range of the EEG signal is between 0.5 and 60 Hz, in order to comply with the Nyquist principle, the data sampling frequency must be more than 2 times 60 Hz, i.e. more than 120 Hz.

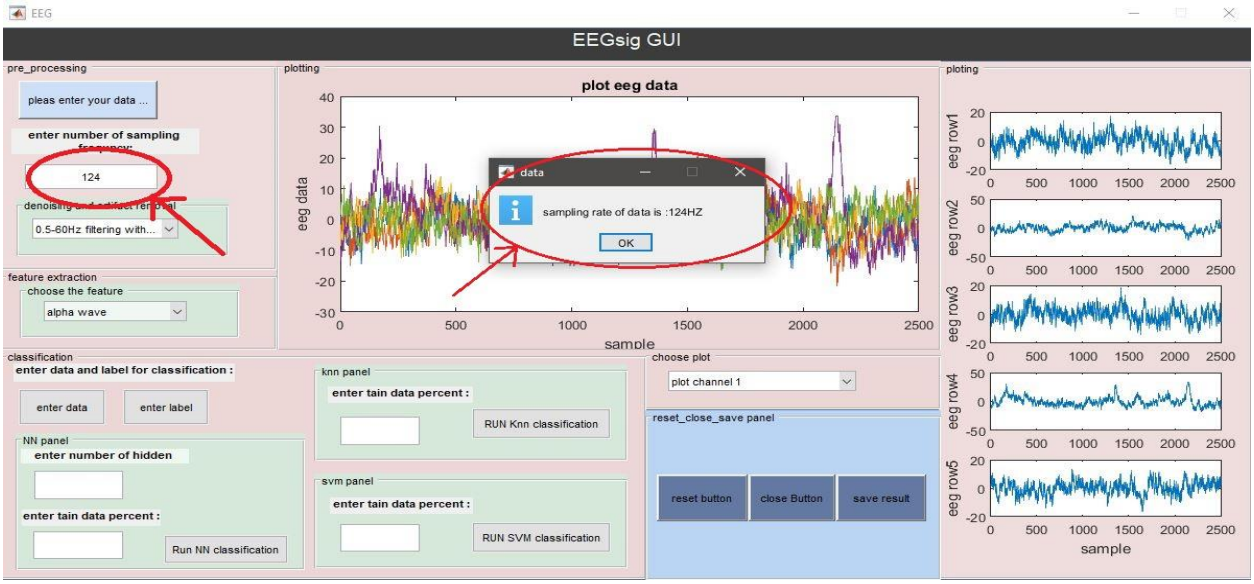

Figure 5 .After entering the data in the desired location, press the Enter key

- **Next step is denoise and artifact removal**

Figure 6 . Now we have to select the denoise and artifact removal by selecting it in the red box on the left and then select the desired channel to view each channel in a larger size.

- **Then it is time to enter the sampling frequency**

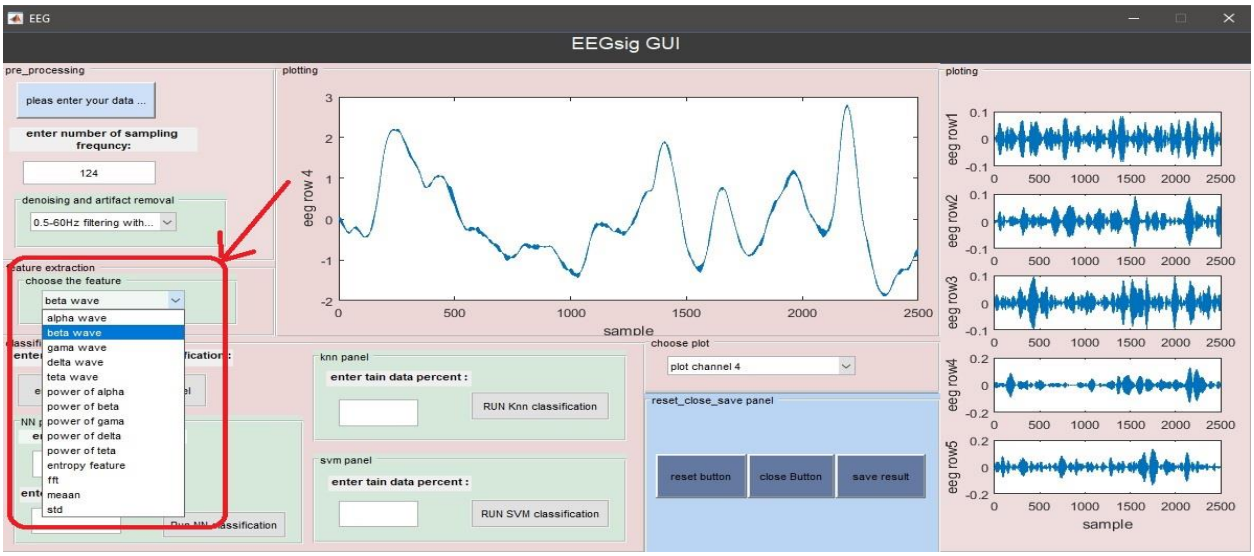

Figure 7 . Select the desired feature to extract the data and display it

How to use EEGsig classification?

- **First, we have to load the feature data and its corresponding label in the software**

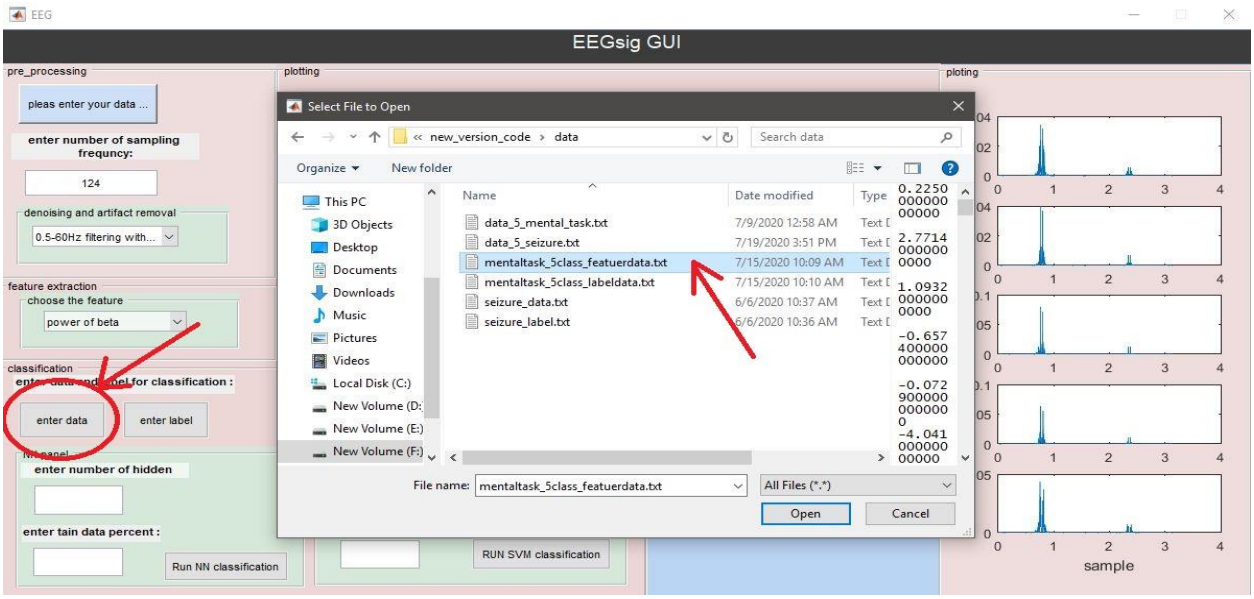

Figure 8 . First, we load the feature data by pressing the button marked with a red arrow

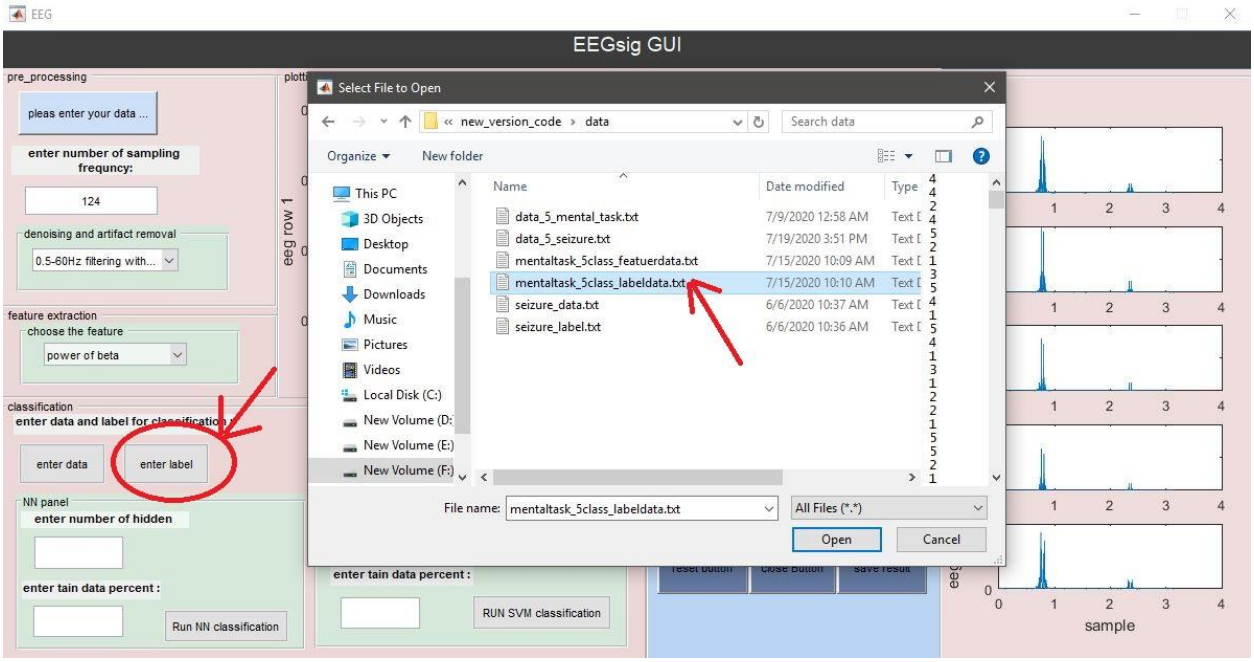

Figure 9 . Then, by pressing the button marked with a red arrow, we load the labels

- **Now we select one of the available algorithms and enter the desired parameters**

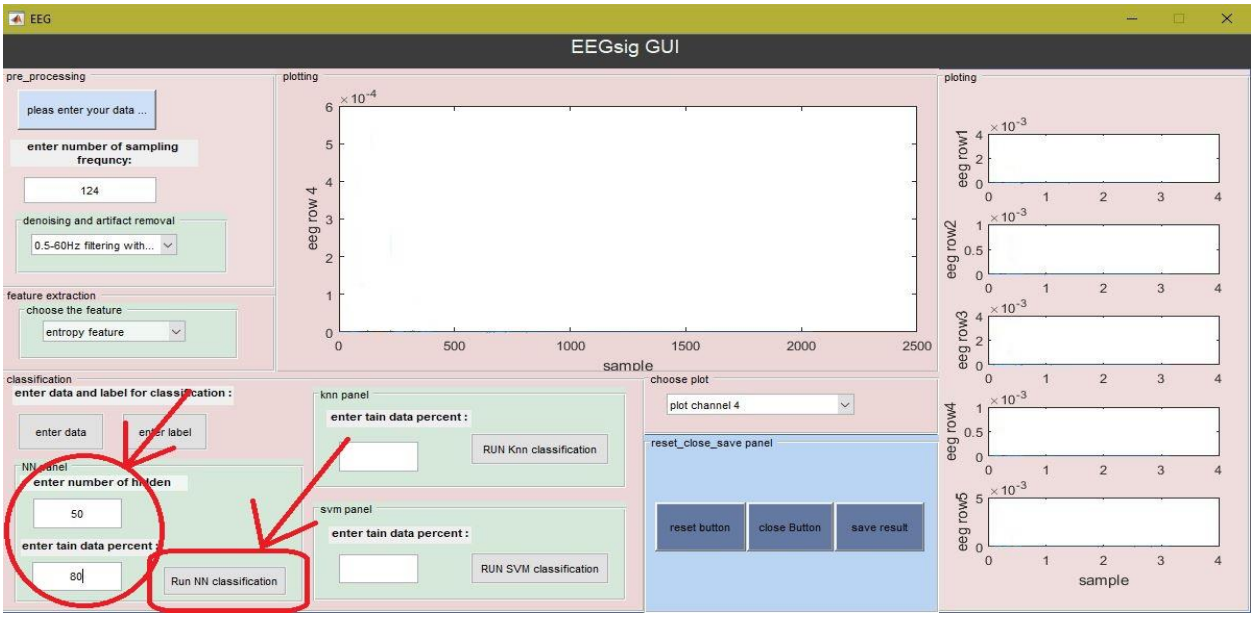

Figure 10 .Here we select the neural network and enter the number of hidden layer neurons and the percentage of training data and then we hit the run button.

- **Now we can see result**