Neurotechnology, Getting started comp 1B

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1 Getting started Guide-comp 1B

1.1 Helmet to OpenBCI connection

OpenBCI GUI is used[1] to connect between the helmet and computer. The connection used is via dongle which sends data via BLE with 125Hz frequency. Choose "cyton(live)" from the menu, "Serial(from dongle)", change channel count to 16 channels and press "Auto-connect".

1.2 EEG-Helmet

The Helmet can be a bit tricky to get on correctly. But fortunately there is a few tricks. The challenge is to have good connectivity from the channels. Using the widget "cyton signal" can be used to check impedance to the different channels, lower impedance is wanted. Most important is the "Time series" widget were one can see the percentage of how close to railed it is or how noisy the signal is. If either the impedance is to high, a channel has to much noise or is railed one has to acknowledge the channel/s. For the bad channels try disconnect screw harder and connect them again. Try to remove as much hair in the way as possible. Sometimes removing the headpiece getting a better fit might be needed. When all channels have good values your ready for next step.

1.3 OpenBCI

Familiarise with the different widgets in the program. The OpenBCI GUI has a network widget were one can choose which communication protocol to send the data too. The LSL protocol had the least package loss, to use LSL follow the Method:2 in [2] to download the libraries needed. To stream via LSL choose what to stream, preferably "Time series" then the type needs to be configured. If two or more computers stream LSL simultaneously with same type the receiver will get all data from all computers such that an unique type could be used, "RevieveData.m" uses "PUKK" as type. OpenBCI GUI automatically saves down the recordings to text files for offline examination located in a "recordings" in OpenBCI GUI folder.

1.4 MATLAB

Firstly the program reads the trained matrixes "w.mat", "mdl.mat" and "bpFilt.mat" such these locations need to be loaded correctly. The helmet from beginning had 16-channels during the project three channels were broken. In the MATLAB code "RecieveData.m" under the while loop the three broken channels are removed and channel 11 and 9 is changed. Channel 9 were on top of the cortex such chnnel 11 that is on the backside could read better values working as channel 9 instead. Configure these depending on the amount of electrodes used and placed. Run MATLAB if you see the text "Resolving an EEG stream..." it's waiting for a stream from OpenBCI. Press start LSL stream in OpenBCI GUI. The text "Opening an inlet..." and "Now receiving data..." will be displayed if done correctly(connection is now established). The stream from OpenBCi GUI can now be started and the data will be read and stored in the "vec" variable for each new sample. If the system also should stream data over to comp three the IP needs to be configured(IP from the computer that will receive data). Port chosen were 1337 which also needs to be configured to be the same on both computers.

References

[1] "Openbci gui," accessed: 10-01-2022. [Online]. Available: https://docs.openbci.com/Software/OpenBCISoftware/GUIDocs/

[2] "Openbci matlab," accessed: 10-01-2022. [Online]. Available: https://docs.openbci.com/Software/CompatibleThirdPartySoftware/Matlab/