EEG Visualizer project

– how Sii helps medics diagnose depressive disorders

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Classification of disorders vs EEG

Major depressive disorder (MDD) and bipolar disorder (BD) are two different types of depression, often difficult to distinguished based on their clinical symptoms. Electroencephalography (EEG), providing important, neurophysiological information about existing diseases and making it possible to predict the reaction to specific methods of treatment, proves useful in this case. According to expert studies, EEG shows abnormalities with characteristic, controversial patterns in about 20–40% of patients struggling with depression. This percentage rises to even 80% for psychiatric patients.

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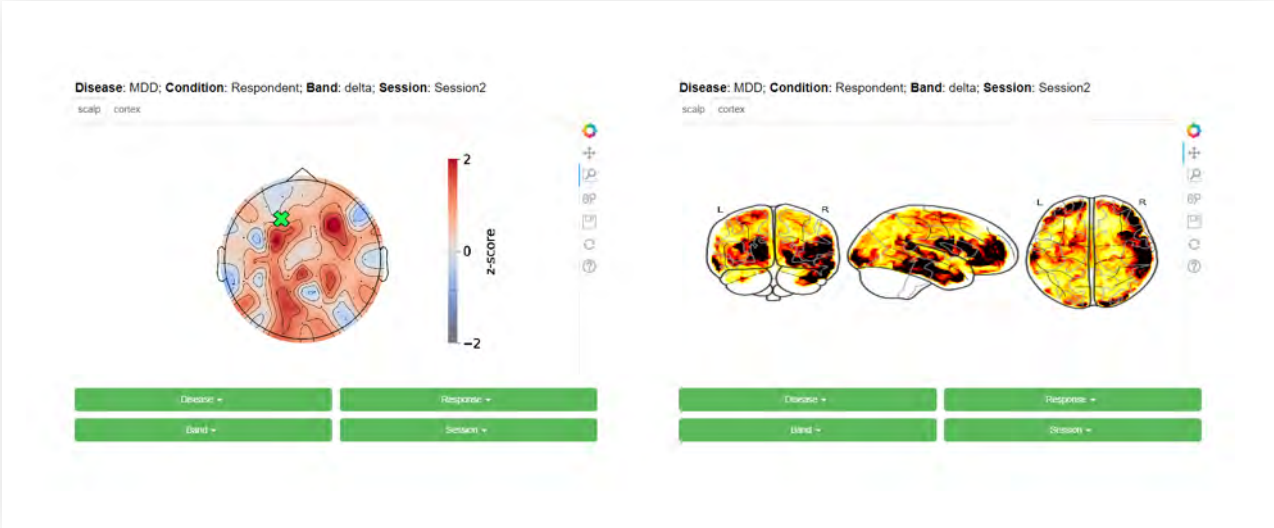
Tests using the EEG Visualizer app

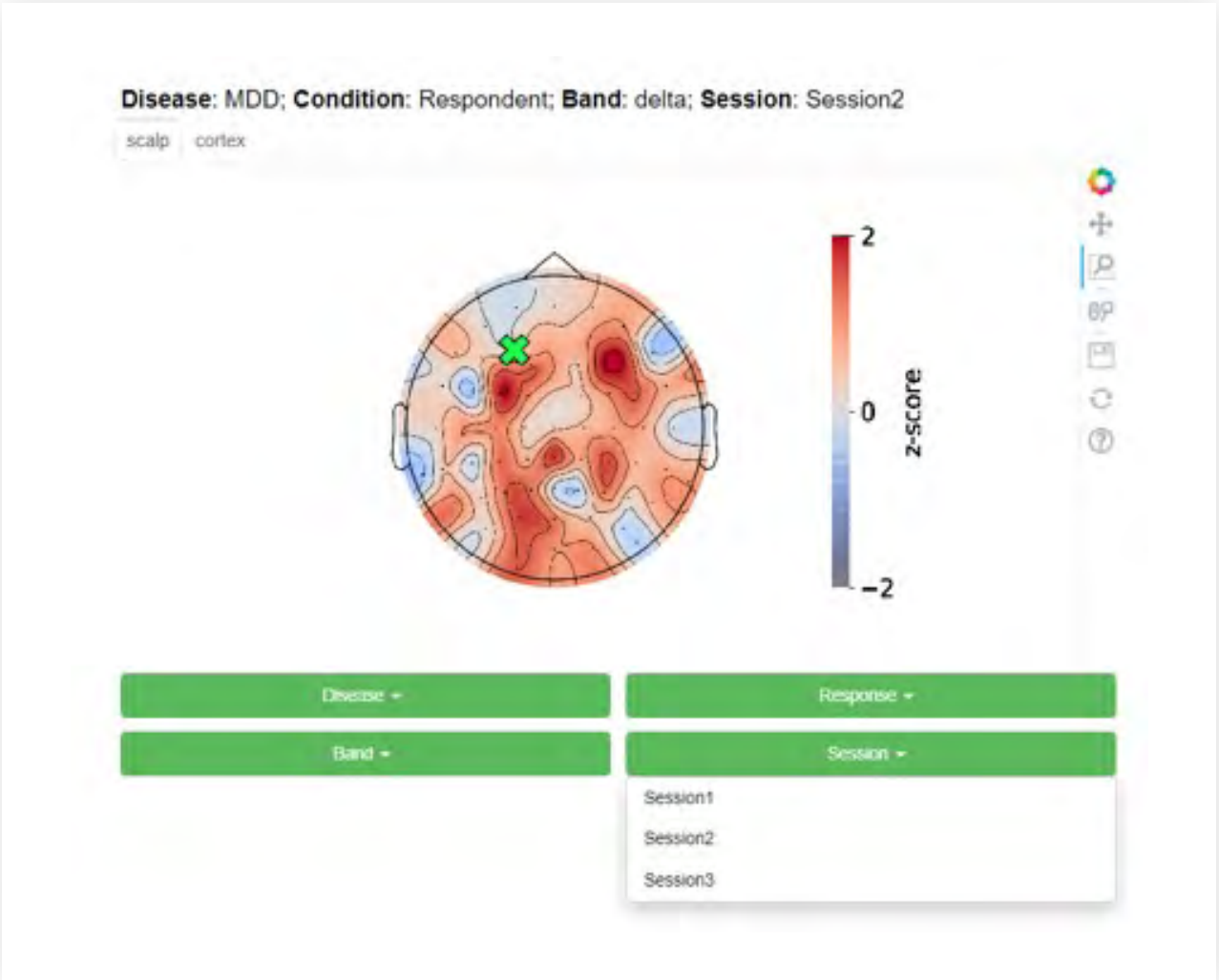
Repetitive transcranial magnetic stimulation (rTMS) of the prefrontal areas of the brain is one of the treatments used on patients whose condition has not improved after receiving various types of antidepressants. Our project involved the verification of whether an electroencephalogram (EEG) at rest could be used to predict the brain's response to 10-Hz rTMS stimulation over the left part of the prefrontal cortex. We also wanted to know to what extent BP and MDD patients show a similar correlation between clinical response and cortical networks at rest. rTMS sessions were performed while recording EEG signals, at the beginning, middle and end of therapy lasting 4 weeks.



The EEG spectral power was partitioned using the common physiological frequency bands and was statistically analyzed at the scalp level and after cortical source reconstruction using the EEG Visualizer app. In the project, we also used Natural Language Processing (NLP) to analyze the forms filled in by patients after each session. All answers were scanned and the information obtained through the NLP algorithm was included in the statistics.

Benefits of using the EEG Visualizer app

With the software used in the project, it was possible to quickly analyze and compare the results from several patients simultaneously. Visualization made it easier to find similarities or anomalies without having to open many files, read descriptions or get acquainted with a huge amount of data collected e.g. in doc, pdf or Excel files. Thanks to the built application, the proposed technologies (**MATLAB, Python, etc.**) as well as the use of NLP, the activities performed by the medic were simplified, and the time required to analyze the results significantly reduced.



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- treatment optimization including personalization

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