**Spikes on Ripples are Better Interictal Biomarkers of Epilepsy than Spikes or Ripples**

**Description:**

This repository contains the codes and sample data for the paper "Spikes on Ripples are Better Interictal Biomarkers of Epilepsy than Spikes or Ripples." The study evaluates the performance of different interictal biomarkers such as spikes, ripples, and fast ripples. It investigates their temporal relationships and assesses the ability of these biomarkers—and their combinations—to delineate the epileptogenic zone and predict outcomes for patients with drug-resistant epilepsy.

**Installation:**

You will need the following software and tools installed on your machine:

* MATLAB (version 2022a or later). This analysis was performed using MATLAB, and version 2022a or later is recommended for compatibility with the provided scripts.
* Brainstorm. Brainstorm is a software platform for the analysis of electrophysiological data. You will need to install Brainstorm to analyze and visualize the EEG data and export the required inputs.
* GitHub Repository. This repository uses a custom MATLAB script for generating spider plots, available from <https://github.com/NewGuy012/spider_plot>.You will need to install it to create the required visualizations.

**Data**

The dataset used in this study consisted of intracranial EEG recordings from 40 children with drug-resistant epilepsy. Spikes, ripples, and fast ripples were annotated based on their temporal occurrence. The analysis uses these data to assess the predictive accuracy of these biomarkers in relation to resection and patient outcomes.

Accessing data: The datasets generated during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

**Results**

The analysis generates key outputs, including:

* Single channel plots with different filtering options and time-frequency analysis
* Barplots, boxplots, piecharts, spider plots
* Rates of biomarker displayed on the patient’s cortex channel by channel.
* Performance metrics such as sensitivity, specificity, accuracy, positive and negative predictive values.
* Figures that display the occurrence of spikes, ripples, and spikes on ripples, as well as performance comparisons.

**Contact**

For questions or further information, please contact:

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