

EPARA Epilepsy (R3.0) README

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1 Introduction

EPARA Epilepsy (R3.0) is an open-source EEG analysis tool designed for epilepsy research, allowing simulation of epilepsy characteristics on EEG data, such as those available on PhysioNet (e.g., CHB-MIT Scalp EEG Database). It is part of the EPARA Suite, developed by Wayne M Spratley and Grok (xAI), licensed under GNU GPL v3.0 for non-commercial research use. The suite challenges scientific norms with bold ideas, leveraging the power of the open-source communityPhysioNet, Ubuntu, Python, and countless moduleswhile working with limited financial resources to advance EEG/BCI research.

2 Installation

2.1 System Requirements

- Operating System: Ubuntu 24.04 LTS (or compatible Linux distribution), Windows 10/11
- Hardware: Minimum 4GB RAM, 2 cores, 1GB free disk space (GPU optional for faster processing)
- Software: Python 3.11/3.12, Tcl/Tk

2.2 Steps

1. Download the EPARA Epilepsy binary from <https://titan-si.com>.
2. Extract the .zip file to your desired directory (e.g., `~/Desktop/openmm_env` on Linux, or `C:/Users/YourUser/openmm_env` on Windows).
3. Install Tcl/Tk if not already present (see How-To Guide for details).
4. Run the binary (e.g., `./EPARA_Epilepsy_R3.0` on Linux, or `EPARA_Epilepsy_R3.0.exe` on Windows).

3 Usage

1. Launch EPARA Epilepsy.
2. Load an EDF file (e.g., `chb01_01.edf` from CHB-MIT).
3. Select a channel (e.g., `FP1-F7`).
4. Set epilepsy simulation parameters (spike rate increase, theta power increase, seizure frequency, amplitude).
5. Run analysis to extract features, view plots, and save results.

4 Features

- **Epilepsy Simulation:** Customizable spike rate increase (0100%), theta power increase (0100%), seizure frequency (38 Hz), and seizure amplitude (0200 V).
- **Epilepsy Metrics:** Spike frequency (spikes per second), seizure duration (seconds).
- **Visualization:** Time-domain EEG plots and spike event detection.
- **Base EEG Features:** Spike Rate, Theta/Alpha/Beta Power, PLV.

5 Example Results

- **Normal EEG (S035R01):** Spike Rate=9.22e-04, Theta=3873164.28, Alpha=9851.38, Beta=767.80, Spike Frequency=0.15, Seizure Duration=0.05s, PLV=0.06
- **Simulated Epilepsy (S035R01_simulated_epilepsy):** Spike Rate=1.83e-02, Theta=473883926352. Alpha=1760750.44, Beta=1050534.96, Spike Frequency=2.93, Seizure Duration=1.86s, PLV=0.94

6 Data Requirements

- Any EDF files with EEG data (e.g., CHB-MIT).
- Baseline EEG: S035R01.edf (healthy, resting state, subject 35, run 1).

7 Disclaimer

For research only not for clinical diagnosis or therapy. Misuse is at your own risk. See GNU GPL v3.0 license.

8 Support

- Follow on [@QuantumRegen](https://x.com/QuantumRegen) (@QuantumRegen, the best place for hard science).
- Donate via https://paypal.me/QuantumRegen?country.x=AU&locale.x=en_AU.
- Visit <https://titan-si.com/help> for docs.

9 Testing Acknowledgment

The EPARA Suite, including EPARA Epilepsy, has been tested exclusively on datasets from PhysioNet, such as the EEG Motor Movement/Imagery Dataset and the CHB-MIT Scalp EEG Database. While the tools have demonstrated robust performance on these datasets, they have not been validated on EDF data from other sources. Users are encouraged to test the tools on diverse datasets and report any issues to the developers via <https://titan-si.com/help>.