EPARA Parkinsons (R3.0) README

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1 Introduction

EPARA Parkinsons (R3.0) is an open-source EEG analysis tool designed for Parkinsons disease (PD) research, allowing simulation of PD characteristics on EEG data, such as those available on PhysioNet (e.g., Motor Imagery datasets). 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 Parkinsons 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_Parkinsons_R3.0` on Linux, or `EPARA_Parkinsons_R3.0.exe` on Windows).

3 Usage

1. Launch EPARA Parkinsons.
2. Load an EDF file (e.g., `S035R01.edf` from PhysioNet).
3. Select a channel (e.g., `Fc5.`).
4. Set PD simulation parameters (beta frequency, amplitude, power increase, spike rate increase, tremor frequency, amplitude).
5. Run analysis to extract features, view plots, and save results.

4 Features

- **PD Simulation**: Customizable beta frequency (1330 Hz), beta amplitude (0200 V), beta power increase (0100%), spike rate increase (0100%), tremor frequency (46 Hz), and tremor amplitude (050 V).
- **PD Metrics**: Beta power ratio (beta power relative to total power), tremor power (46 Hz).
- **Visualization**: Time-domain EEG plots and frequency spectrum highlighting beta and tremor bands.
- **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, Beta Ratio=0.00, Tremor Power=3321127.27, PLV=0.06
- **Simulated PD (S035R01_parkinsons)**: Spike Rate=2.01e-02, Theta=1743820.73, Alpha=6669.83, Beta=6071529848.85, Beta Ratio=1.00, Tremor Power=1733964.01, PLV=0.27

6 Data Requirements

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

7 Disclaimer

For research onlynot for clinical diagnosis or therapy. Misuse is at your own risk. See GNU GPL v3.0 license.

8 Support

- Follow on `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 Parkinsons, 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`.