

HFO Rate Ratio

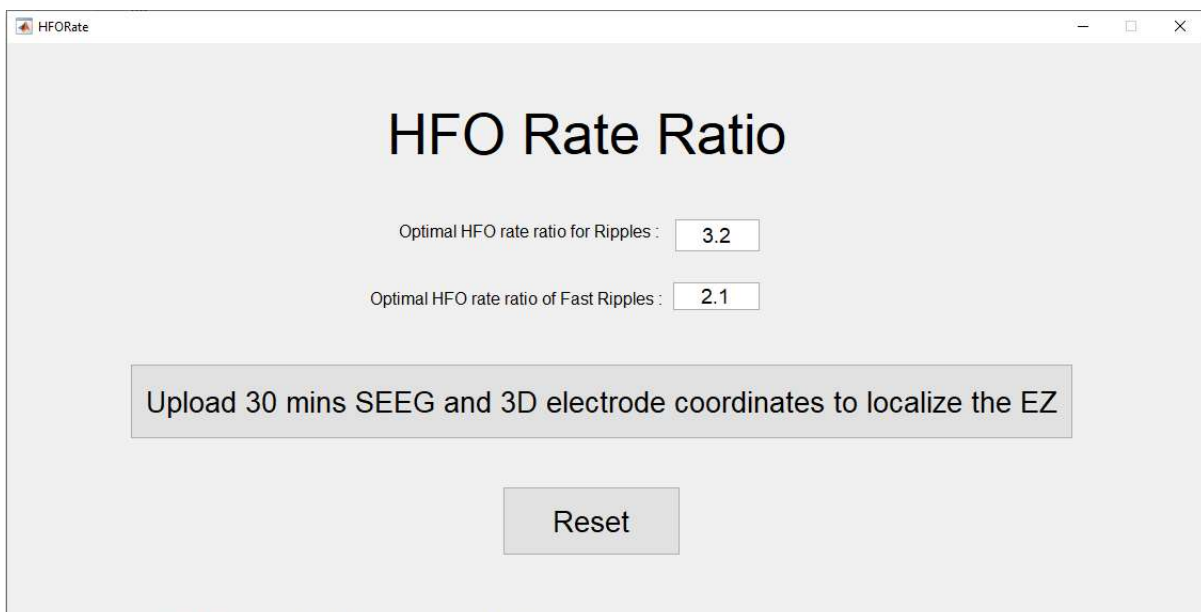
The HFO rate ratio tool is featured in the article "Parasuram et al, Mapping physiological HFO rates of the cerebral cortex for improved epileptogenic zone characterization in stereo-EEG, 2024". This tool is designed to localize epileptogenic zones from interictal SEEG recordings.

Prerequisites

1. MATLAB Runtime R2021a: Download and install the Windows version of MATLAB Runtime R2021a (9.10) from [here](#).
2. Sample Data: Sample SEEG data will be made available upon request.

Instructions for Using the HFO Rate Ratio Tool

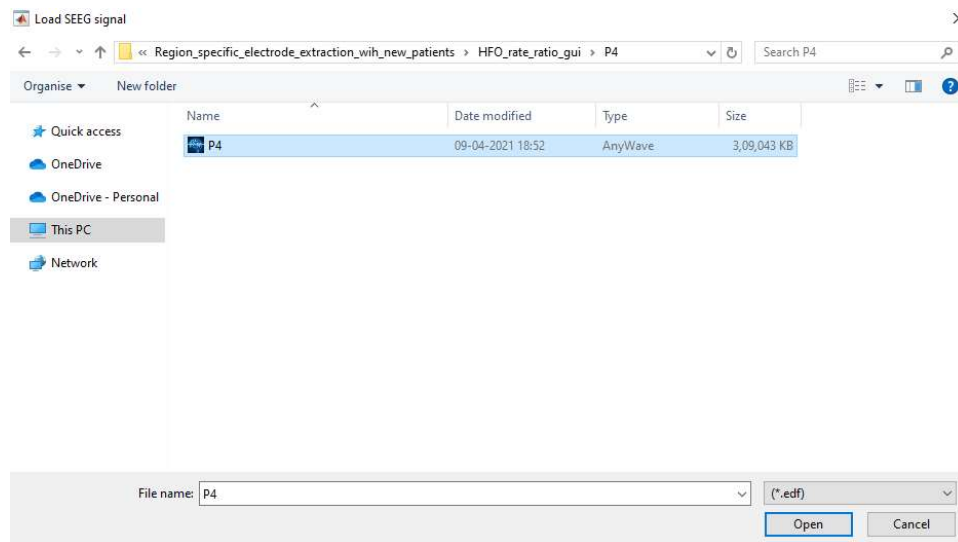
1. Download the tool from <https://github.com/Brain-Mapping>.
2. Unzip the file, then double-click "HFORateRatio.exe" on a Windows computer. The tool interface will appear as shown below.



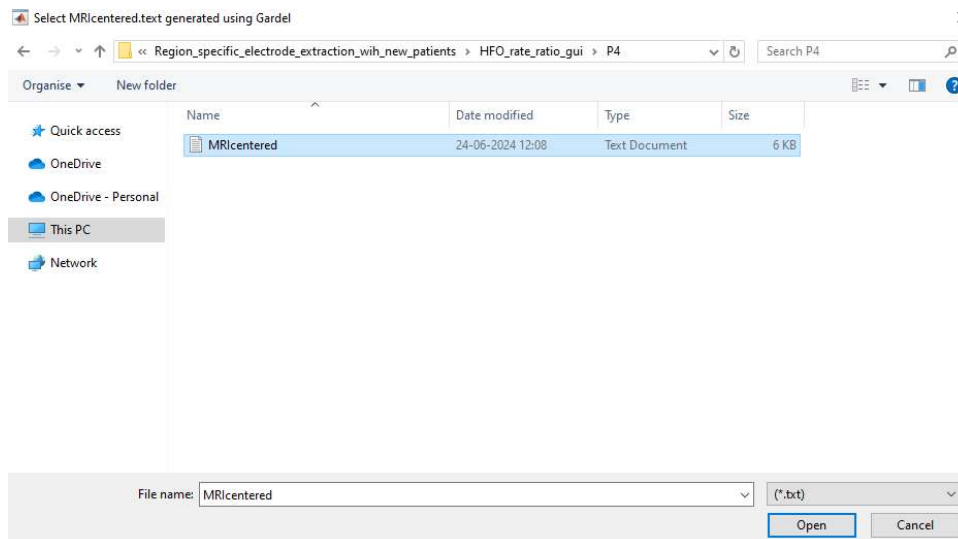
The screenshot shows the HFORateRatio tool interface. It has a title bar with the text "HFORate" and standard window controls. The main content area has a large heading "HFO Rate Ratio". Below this, there are two input fields: "Optimal HFO rate ratio for Ripples :" with a value of "3.2" and "Optimal HFO rate ratio of Fast Ripples :" with a value of "2.1". Below these fields is a text box containing the instruction "Upload 30 mins SEEG and 3D electrode coordinates to localize the EZ". At the bottom center, there is a "Reset" button.

3. Click on "Upload 30 mins SEEG and 3D electrode coordinates to localize the EZ" button to upload SEEG and 3D electrode coordinates to initiate the HFO detection and EZ localization.

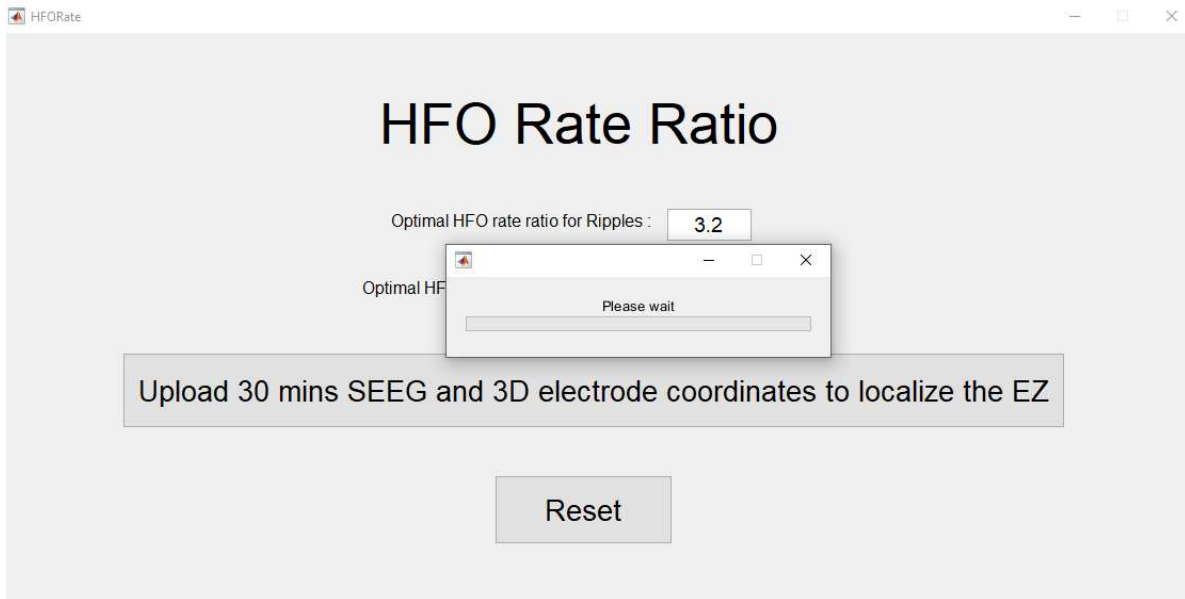
The SEEG data should be in ".edf" format. Load the SEEG.



4. Load the "MRICentered.txt" file generated using the GARDEL tool. For more information about GARDEL, visit, <https://meg.univ-amu.fr/wiki/GARDEL:presentation>



After loading the "MRICentered.txt" file, the process will begin automatically.



5. Once HFO detection and EZ localization are complete, a pop-up will appear as shown below. A PDF named "HFO_rate_ratio.pdf" will be generated, containing the details of the EZ localization.

Region specific HFO rate analysis was done.

EZ localized using Ripples

Contact	Brain Structure	HFO rate Ratio > 3.2
TP'1-TP'2	Left-Amygdala	7.8813
H'4-H'5	Left-Hippocampus	7.7855
H'2-H'3	Left-Hippocampus	7.7232
H'3-H'4	Left-Hippocampus	7.4117
H'5-H'6	Left-Hippocampus	4.5467
TP'2-TP'3	Left-Amygdala	3.5654

EZ localized using FastRipples

Contact	Brain Structure	HFO rate Ratio > 2.1
TP'1-TP'2	Left-Amygdala	13.4799
TP'2-TP'3	Left-Amygdala	2.6693
H'4-H'5	Left-Hippocampus	3.0417
H'2-H'3	Left-Hippocampus	3.9977
H'3-H'4	Left-Hippocampus	4.0846

Reference

1. Zelmann, R., Mari, F., Jacobs, J., Zijlmans, M., Chander, R., & Gotman, J. (2010). Automatic detector of high frequency oscillations for human recordings with macroelectrodes. Annual International Conference of the IEEE Engineering in Medicine and Biology Society. IEEE Engineering in Medicine and Biology Society. Annual International Conference, 2010, 2329–2333. <https://doi.org/10.1109/IEMBS.2010.5627464>
2. Medina Villalon S, Paz R, Roehri N, et al. EpiTools, A software suite for presurgical brain mapping in epilepsy: Intracerebral EEG. *J Neurosci Methods*. 2018;303:7-15. doi:10.1016/j.jneumeth.2018.03.018