EEGpal: **Find peaks** and **Average Time interval module**
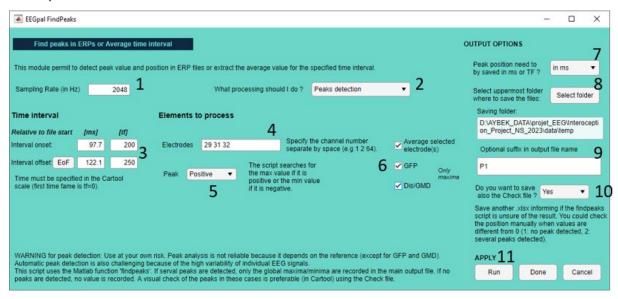
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The module 'FindPeaks' has two possible functions. Firstly, it allows to find the highest positive (max) or negative (min) peaks in the specified time interval. The module generates an Excel file with amplitude and position. The user has the possibility to record a check file informing if no peaks (=1) or several peaks (=2) have been detected in the time interval. In the case of multiple peaks, the main output file will by default only record the maximum of the minimum.

The second functionality of this module is to calculate the average of the signal in the specified time interval. This would be useful for extracting values to make plots.

Find peaks

1. Sampling rate of the data. Normally should be automatically transfer from the main windows. You can adjust if it is not the case.
2. Choose the action to perform between **Find peaks** and **Average time interval.**
3. Specify the time interval. WARNING: The value 0 is the beginning of the file. This module don't take account about possible .mrk file which could define another origin.
   EoF=End of File.
4. Specify the electrode to study, Specify the indices of the electrodes (1 2 64) and not the name specified by the coordinate file (A1 A2 B32).
5. Specify if you want to detect positive peaks (looking for maxima) or negative peak (looking for minima).
6. In addition, you can detect the peaks for the average of specified electrodes in **4**, on the global field power (GFP) or on the global map dissimilarity (GMD). The result for GFP and GMD is independent of the parameter **5**. Indeed, the values are always positive so the module will always return the maxima.

7. Specify if the peak position should be specified in millisecond (ms) or in time frame (tf) in the output file.
8. Select the output folder where the output will be recorded.
9. You can specify manually a suffix in the output file name. For example: *PeakDetection_Positive_98-122ms_P1.xlsx*
10. Record an additional check. Read the section **How can I use the check file?** bellow**.**
11. Run the module and generate the output.

What the output looks like?

The first columns are the amplitude and the last columns are the position, either in milliseconds or in a time frame according to parameter **7**.

How is the peak detection performed?

The module uses the Matlab function *findpeaks*. It specifically looks for a high value surrounded by smaller values. It never detects the boundary of the interval as a peak. This function only detects local maxima. To detect local minima, the signal is inverted. It is therefore important that you do not detect a positive peak (max) and a negative peak (min) at the same time. You must perform two separate runs by changing the option **5**.
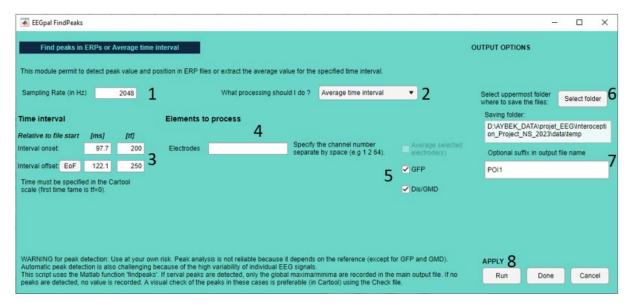
What happens if there are several local peaks?

The Find Peaks module will always return only one peak in the output file. It will report the peak with the largest amplitude (for positive peaks) or the smallest amplitude (for negative peaks). However, the check file allows you to know if more than one peak has been found by recording the value **2**.

How can I use the check file?

The optional check file allows you to know if only one peak is detected in the interval (**value=0**), no peak is detected (**value=1**) or several peaks are detected (**value=2**). You can use this information to look at the signal yourself in Cartool to possibly correct the position according to your own expertise.

Files	Check_e29	Check_e31	Check_e32	Check_Average	Check_GFP	Check_GMD
P001_epoched_Trigger_5	0	0	0	0	1	2
P001_epoched_Trigger_6	0	1	1	0	0	0
P001_epoched_Trigger_7	1	1	1	1	1	2
P001_epoched_Trigger_8	0	0	0	0	0	2

Average time interval

1. Sampling rate of the data. Normally should be automatically transfer from the main windows. You can adjust if it is not the case.
2. Choose the action to perform between **Find peaks** and **Average time interval.**
3. Specify the time interval. WARNING: The value 0 is the beginning of the file. This module don't take account about possible .mrk file which could define another origin.
   EoF=End of File.
4. Specify the electrode to study, Specify the indices of the electrodes (1 2 64) and not the name specified by the coordinate file (A1 A2 B32).
5. In addition, you can average of specified electrodes in **4**, the global field power (GFP) or the global map dissimilarity (GMD).
6. Select the output folder where the output will be recorded.
7. You can specify manually a suffix in the output file name. For example:
   AverageTimeInterval_200-250tf_POI1.xlsx
8. Run the module and generate the output.

What the output looks like?

A	B	C
Files	TimeAvg_GFP	TimeAvg_GMD
P001_epoched_Trigger_5	1.055172855	0.048798455
P001_epoched_Trigger_6	1.08188914	0.050110248
P001_epoched_Trigger_7	0.236965597	0.028066206
P001_epoched_Trigger_8	0.506421099	0.028998623