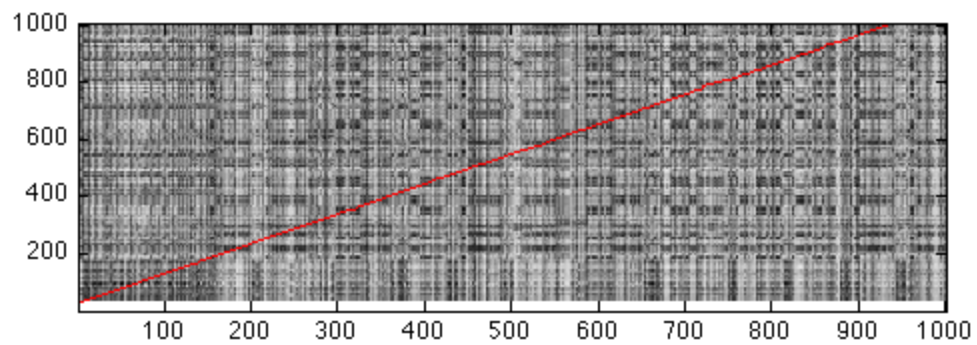
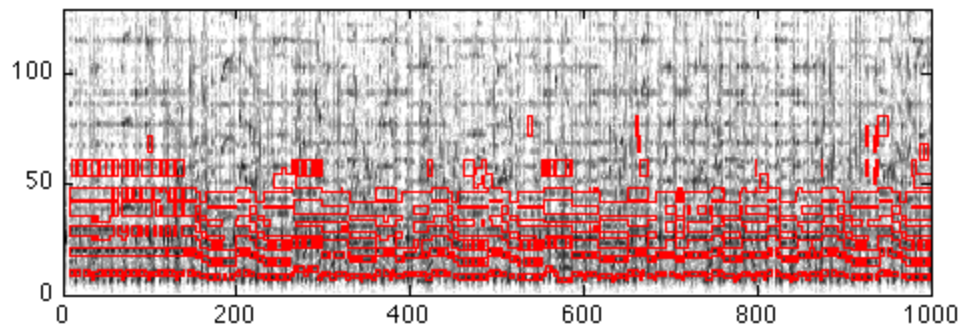


Pattern Template Matching



Pattern-Template Match Dialog

DISCLAIMER

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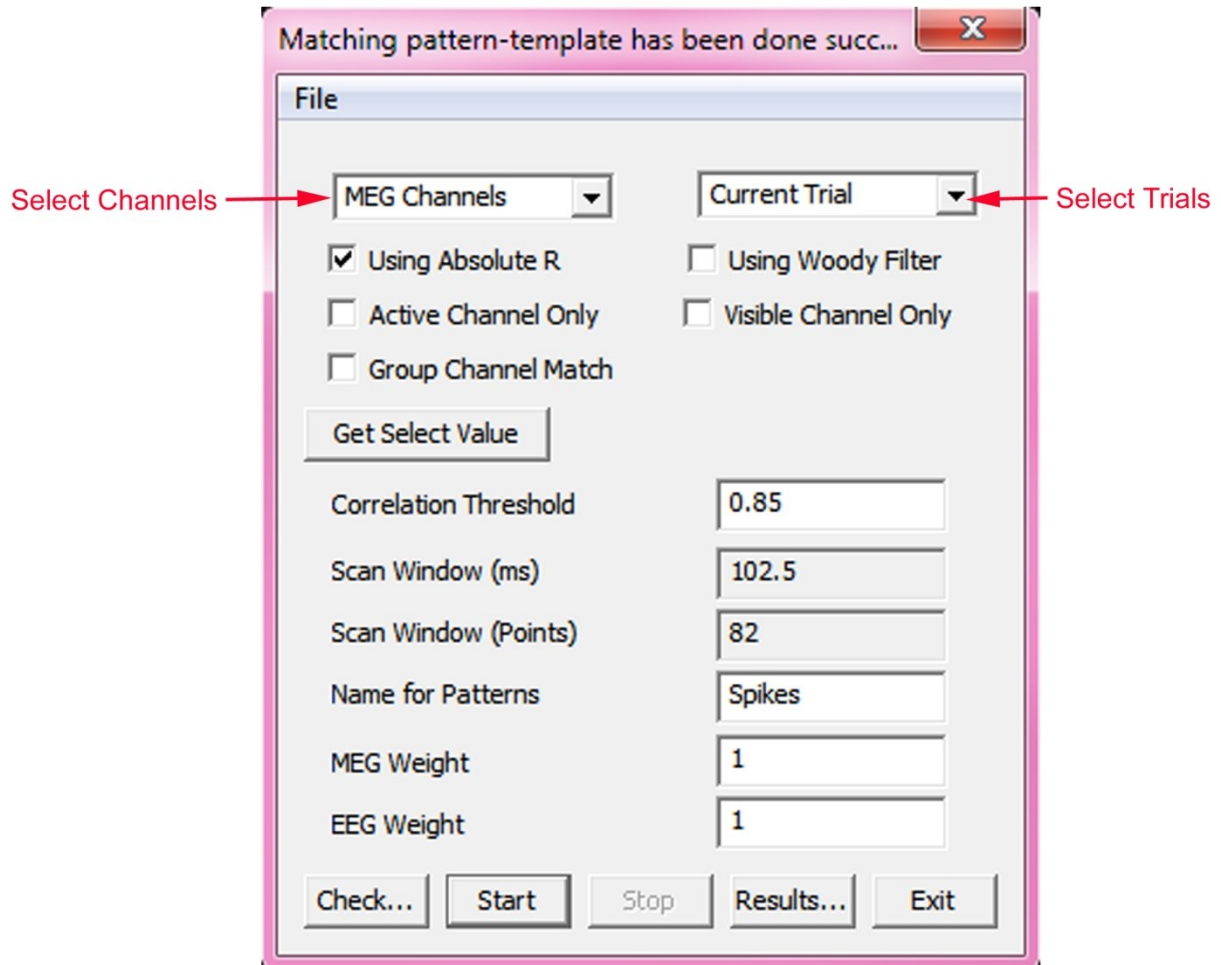
Features and specifications of this software program are subject to change without notice. This manual contains information and images about MEG Processor, its user interface, GUI and its other signal processing algorithms, publications that are protected by copyright.

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Thank you.

Pattern-Template Match Dialog



1. Select the channel(s) to perform pattern-template matching.

Select one or more channels, channel groups, or channel types to mark. (For more information, see "Selecting Channels in the Main Window" on page 36.)

Pattern-Template Match Dialog

WARNING and NOTICE

Different type of EEG/MEG channels (e.g. MEG, EEG, ADC and Trigger) may not be distinguished from each other in terms waveforms. However, because their values are typically of different orders of magnitude, unexpected results may occur if different type of channels are selected for simultaneous threshold detection. To avoid problems, only select one type of channels (MEG or EEG) at a time.

Note: Do not select MEG and EEG channels at the same time.

2. Use the range cursor to select the pattern-template data.

If you want to base the pattern-template on a waveform pattern (e.g. Spike, or spike-and-wave discharge, high-frequency bursts) in the current dataset, select it using the range cursor. Alternatively, you can open a template dataset file to use as the template.

3. Open the Pattern-Template Matching dialog.

From the Main Frame, select the Edit -> Pattern-Template Matching menu option to display the Pattern-Template dialog (see Figure 64 on page 120).

4. Specify weight and correlation values.

Enter values for the weight to apply to EEG and MEG channel types when more than one channel is selected, and for the correlation threshold (the minimum correlation required for a match).

5. Specify names for the pattern-template matching event and scan window.

Enter the scan event to locate during template matching (the marker set name) and the scan window (the number. of samples centered around this event over which template matching will be performed).

The Scan event and Scan window fields are useful when you want to locate an existing marker (the scan event), then apply the template pattern over an area of data around the marker (the scan window) to search for a similar pattern in the data. For example, you could first run the spike/spike-wave-discharge/rhythmic bursts application to mark all the events in the data, then search for the spike markers and compare the shape of the patterns in the marked samples to the template pattern. To speed processing, you can specify a scan window around the spike markers, rather than performing template matching over the entire dataset. When a match is found, the template marker will be placed at the midpoint of the matched range.

If you do not specify these fields, the program will apply the template pattern across all data in the current trial (or entire dataset) without looking for any previous markers.

6. Specify the pattern-template data.

Pattern-Template Match Dialog

The template data can be a range of data in the current dataset that you select using the range cursor, or it can be the data in a template data file.

Range cursor selection: If you have not yet selected a pattern in the current dataset to use as the template, you can use the range cursor to do this while the dialog is open.

After making the selection, click the Set to range cursor button to update the dialog.

Template data file: If you want to use saved template data as the pattern instead, click the Open template data button then select the template dataset to use.

For either method, enable the Update Template (Woody Filter) option if you want to update the template as each match is made to create a running average of the original template pattern and all the matches.

7. Specify names for the marker set and trial classification.

In the Save Marker as field, enter a name for the marker set to use for marking samples that match the template pattern. If you want to classify trials that contain matched events, enter a name for the trial class and indicate whether you also want to classify the trials as BAD. For more information about the trial classification area of this dialog, see “Classify trial as” on page 126.

8. Specify the applicable channels.

If you have already selected the channels on which to apply template matching before opening the Template Matching dialog, they will be listed in the bottom pane. You can also select channels in the strip chart while this dialog is open (or change the existing channel selection). Click the Select Channels button to update the channel list in the bottom pane if you add or change the channel selection.

9. Specify the trial scope.

At the bottom of the dialog, select whether you want template matching to apply to all trials (Scan All Trials option) or only the current one (Scan Current Trial Only option).

10. Begin template matching.

Click the Apply button.

During the pattern-template matching process, the program will create the specified marker set (if it does not yet exist) and add markers to samples that match the template data. If you have enabled trial classification, it will also create the trial classification (if it does not yet exist) and classify trials containing the matched events. For more information on the Pattern Matching dialog, see “Template Match” on page 122.

Pattern-Template Match Dialog

This menu option displays the Template Matching dialog shown in Figure 65 on page 124. This dialog is used to locate and mark like events by comparing data across one or more specified channels to the spatial pattern defined in the template. Template matching is often used after data points of interest have already been marked using another method. For example, you could first run the spike/rhythmic burst scan application to mark all the spikes in the data, and then use template matching to compare the marked samples with a template pattern to locate the ones that have the same shape as the template. You can also run template matching on unmarked data to mark events with the same shape as the template pattern. If desired, template matching can classify the trials in which the patterns occur at the same time as it marks these events.

When a match is found, the new template marker will be placed at the midpoint of the matched range. The template you use may be a saved template dataset file, which you can load from the Template Matching dialog, or it can be a data range in the current dataset that contains the pattern you want to match. For the latter case, use the range cursor to select the desired data, then click the Set to range cursor button in the dialog to specify this data as the template to use. (See “Set to range cursor” on page 125 for details.)

Template matching operates over whichever channels you specify. You can either select the channels by clicking the corresponding channel names in the strip chart before opening the Template Matching dialog, or you can select the channels after opening the dialog, then click the Select Channels button to include them in the pattern matching process. Included channels will appear in the bottom pane of the dialog.

If no channels are explicitly selected, the template match algorithm will select channels that have peak-to-peak values in the template window range that are greater or equal to 0.67 of the maximum peak-to-peak of all channels (in the template window range).

If multiple channels are selected, they are treated collectively as a spatial vector, and a vector correlation is performed. Note that the numerical values of EEG and MEG data are of very different orders of magnitude (10^{-12} [T] vs. 10^{-4} [V], respectively). The purpose of the weighting is to reconcile this difference since the correlation functions strictly on numerical values. A typical weighting is 1 for MEG and 10^{-8} for EEG.

The Pattern-Template Matching dialog as shown above is explained below. For more information on using this dialog, see “Marking Data Using Template Matching” on page 48.

MEG Channels

The threshold detection will be performed on MEG channel only.

EEG Channels

Pattern-Template Match Dialog

The threshold detection will be performed on EEG channel only.

Others Channels

The threshold detection will be performed on non-MEG/EEG channel only, such as Trigger, head motion and other ADC channels. In this case, “Active Channel Only” and “Visible Channel Only” are typically enabled, so that the threshold detection can be performed on one or more specific channels.

All Trials (Scan)

Scans all trials in the dataset during the threshold detection process.

Current Trial (Scan Only)

Scans only the current trial during the threshold detection process.

Weight

Specifies the weight to apply to EEG and MEG channel types when there is more than one channel selected for template matching. A typical weighting is 1 for MEG and 10^{-8} for EEG.

The best way is to perform Pattern-Template Matching for either MEG or EEG or other type of channels. The program will automatically track each type of channels.

Correlation Threshold

Specifies the minimum correlation required for a match to be found, where

1 = perfectly correlated

0 = completely uncorrelated

-1 = inversely correlated

Typically, you should enter a correlation threshold of 0.8 or higher.

Scan (event)

Performs template matching only around data points marked with the name shown in the text field box. This feature is used when you want to compare previously marked events (e.g., by threshold detection)

Pattern-Template Match Dialog

to the template pattern. When a match is found, the template marker is placed at the midpoint of the matched range. If you leave this field blank, template matching is performed over the entire dataset.

Scan window

Defines the range around the scan event in which the program will search for the pattern. The range (i.e., number of samples you specify here) will be centered around the scan event. If you leave this field blank, template matching is performed over the entire dataset.

Set to range cursor

Uses the data within the range cursor as the template. If you modify the cursor range after opening Pattern-Template Matching dialog, you can update the dialog with the current range values by clicking this button.

Update Template (Woody Filter)

Updates the template as each match is made to create a running average of the original template pattern and all the matches.

Automatically Store markers

Saves a marker for a detected event. Data points that meet the template matching are marked with the name entered in the text field box.

Note: Markers with the name entered in the text field will NOT be deleted from the dataset. New markers will be added based on the new template matching run.

Open template data

Displays a dataset selector dialog from which you can open a dataset as a template. When loaded, the template dataset name, as well as the number of trials and samples, will appear to the left of this button.

Pattern-Template Match Dialog

Save template data

Displays a dataset selector dialog from which you can save a dataset as a template.

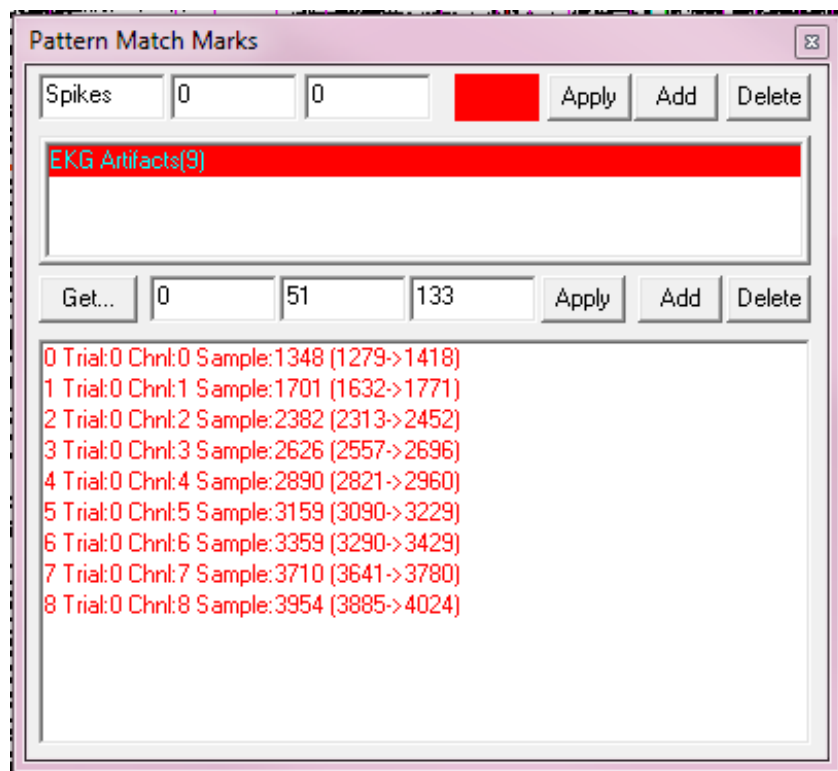
Classify trial and channels

The Pattern-Template Matching event marks enable automatic classifying of trials. The classification method depends on how the toggle controls are set. If you enable the first toggle control, the trial will be classified as both BAD and the name entered in the text field box. If you enable the second toggle control, the trial will only be classified with the name entered in the text field.

Note: Trial classifications with the name entered in the text field box will be deleted from the dataset. New trial classifications will be added based on the new template matching run.

Results

Shows all the events matched the defined Pattern-Templates (see the following Figure)



Pattern-Template Match Dialog

Exit

Exits the Threshold Detection dialog without taking any (further) action.