The Spectral Signal Processing Suite version 1.0, GUI documentation

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1 Introduction

All the functionality of the Spectral Signal Processing Suite can be accessed through the toolbar and Menus of the Graphical User Interface (GUI).

2 Toolbar

Figure 1: tool bar

A description of the button actions. The buttons are described from left to right as they appear on the toolbar.

green button Initiates a calculation.

red button Stops a calculation.

grid point button Causes dots to be plotted at the points of the grid.

R Refreshes the graphics. Press this button after a function or exact/reference function has been loaded. Can be used to view incremental results of long calculations.

SP Saves the postprocessed function to a text file. Not available when running as an Applet.

SE Saves the edge series array to a text file. Not available when running as an Applet.

SN Saves the nonlinear enhancement series to a text file. Not available when running as an Applet.

PP Displays the postprocessing dialog box. The global Gegenbauer parameters, k_λ and k_m, may be set through the dialog box.

EP Displays the edge detection dialog box. The edge detection parameters J (JCRIT), Q, and η (NE) may be set through the dialog. The parameters Ae and Be correspond to the interval $[Ae, Be]$ in which edgeDetectAB.findEdges() looks for looks for edges in the derivative of a function.

FP Displays the filter parameters dialog. The dialog contains the exponential filter parameters, $alpha$, $beta$, and $cutoff$ (only applies the filter to modes above the parameter $cutoff$). The parameter EPS is input into the method hybrid.postProcess().

MP Displays the map parameters dialog. The dialog contains the variable map (0-GL, 1-KT, 2-Center, 3-Tangent) used to specify the grid point locations. The parameters for the maps are α_m (alpha) and β_m (beta). A and B specify the endpoints of the interval $[A, B]$ on which the function is known.

AP Displays the application parameters dialog. The parameters $uMin$ and $uMax$ specify plot ranges. The parameters $nfmin$ and $nfmax$ specify the number of decimal places displayed in output in the text window. Nex and M are parameters used in the first four examples on the Examples menu.

S Allows edges to be manually selected. Press the button and then click on edge locations in the function. Press the button a final time after all edges have been selected in order to accept the edges.

AD Accepts edges in the derivative of a function. Places edges in the proper location in the array of edge locations of the function.

GB Displays the GegenbauerB dialog box. The dialog becomes available after the method gegenbauerReconstruction.postProcess() has been evaluated. The dialog can be used to independently select the reconstruction parameters m and λ in each smooth subinterval.

HB Displays the hybridB dialog box. The dialog becomes available after the method hybrid.postProcess() has been evaluated. The dialog can be used to independently select the reconstruction parameters m, λ, and EPS in each smooth subinterval.

3 Menus

- Options Menu

  Text output 1) Send L_1, L_2, and L_∞ errors between the post-processed and exact/reference solution to the text output window. 2) Display

pointwise errors in the text output window 3) Send edge locations to the text output window.

Look and Feel Change the Look and Feel of the GUI.

Other Options 1) Show Tooltips 2) White plotting background 3) Options to not display coordinate axis 4) Display (x, y) coordinates of a mouse click in the text output window.

- File Menu (not active in Applet mode). Parameters in both the *Map* and *Applications* dialog boxes should be set before loading functions to be processed.

  Load Functions

  Load Exact/Reference

- View Menu. Any combination of these options may be displayed at once.

  Function

  Exact/Reference

  Derivative

  Edges

  Non-linear enhancement

  Post-processed

  Manual Edges

- Mode Menu. One, and only one, option must be selected.

  Find Edges

  Find Derivative Edges If this option is selected, Ae and Be must be set using the Edges Dialog Box to determine the interval $[Ae, Be]$ to search for edges in.

  Postprocess If this option is selected, an additional choice must be made from the postprocessing menu.

- Post-processing Menu

  Gegenbauer Gegenbauer Reconstruction Procedure (GRP) with global parameters.

  GegenbauerB Gengenbauer Reconstruction with parameters set independently in each smooth sub-interval (GRPb).

  Exponential Filter Filter strength and order is set in the *Filter Dialog Box*.

  Hybrid Combination of GRP and exponential filter.

  HybridB Combination of GRPb and exponential filter.

- Examples Menu - Contains examples to demonstrate the use of software and algorithms.

4 Data Format

In non-Applet mode, functions to be postprocessed may be loaded from a data file. Functions to be loaded should be saved in a delimited text file. For example,

```
3.857371260828232
3.856914077499108
3.8573733687189935
3.856910526543115
        .
        .
        .
3.8573775641731034
3.8569075357332805
3.8573794537682073
3.8569058169846917
3.857379802430733
3.856905284485698
```

The default directory in which the program looks for data files is

`C:/j/signal/data/`

The directory may be changed by the setDataDirectory() method. See the file pp.java for example.