Program InpGraph on Graphic Data Processing for the Exfor Library

by G.Pikulina, S.Taova

CNPD, Russian Federal Nuclear Center – VNIIEF, Sarov 607188, Russia

The task of digitizing software consists of extracting numeric data from discrete image and exporting into the Exfor format. It could be divided into two stages. The first stage includes loading a discrete image, its processing, obtaining arrays of data curves connected with the image coordinate system, accessing the accuracy of calculations. At the second stage calculation of numeric data in physical coordinates, their validation and sorting, creation of the result Exfor file should be done. Both stages are joined under the single program environment InpGraph.

The new version of InpGraph is intended to have a flexible structure and easy-to-use interface. It doesn't demand special training for users. We use Wizard technology as an additional helper function for step instructions and hints.

A strict order of operations is optional. It is possible to come back at any digitizing stage and make corrections. A project file of binary format stores the intermediate digitizing results and source image.

We like the words of Sandor Takacs about the quality of user's interface he said at the last Workshop. The fewer number of clicks is needed the better is the program for user. We have taken these words as our slogan and try to implement it in practice.

User has to fulfill the following actions to create a file of the Exfor format from a discrete image:

1. Open a new project and import an image any convenient way: from files of different graphic types, through a clipboard or capture a part of screen.

2. Input necessary service information – Entry number and Additional independent variables. The Headings and Units of variables are selected from Exfor Dictionaries.

3. Determine Axes soever you please: mark an axis automatically having set its direction and the first and last ticks or input ticks in a handle mode.

User can add any number of abscissa and ordinate axes at any digitizing stage.
To enter information about axes (Headings, Units) the data from Dictionaries 24 and 25 are used (Search by symbol combination is also possible).
User can check linearity and accuracy of axes in the stage of their input.
<u>New features in axes editing are the following:</u> user can rename the selected axis, change its color. It is possible to delete any component of the axis or erase it at all.

4. Digitize curves: first it is necessary to input values for additional independent variables then to specify axes for each curve. Press Point button and click on the point of an image. Set errors on both axes if it is necessary.

Services in curves digitizing are facilitated by the following possibilities:

MinMax, Err Mass Y, Err Mass XY input modes are available. (MinMax – data are presented in a form of a vertical line with undistinguished geometrical center. Err Mass Y – this mode may be chosen when all data points have error bars on Y axes, Err Mass XY – this mode may be chosen when all data points have error bars on both axes. So user don't need to click every time on button ErrX or ErrY).

User can add any number of curves at any digitizing stage under any mode, delete the selected curve, clear its content, delete selected point or error bar, change color of the selected curve. Every curve has its own editable name.

5. Compile data and export into Exfor format. Results of digitizing are stored in files with EXF extension. Service files with extensions AXS, SRC are also created during compilation. Special edit window is opened with result file to make corrections (if it is necessary) in it and input additional service information.

In conclusion, there are some remarks on calculation of digitizing error. We reported on our approach during the meeting in Slovakia. In InpGraph we calculate the digitizing error (δ) as a value of standard deviation of the digitized value and true value on ticks. We also calculate quantization error (Δ) determined by resolution of a scanner or display. Now we put the value of standard deviation in the columns with names (ERR-DIG) of COMMON section and present the value of quantization error as additional service. User could insert the value of quantization error into the Exfor file as a free text. In some cases the value of quantization error is high enough and should not be ignored.

Our proposal was to determine *digitizing error as Max (δ,Δ)*. **It is necessary to approve the approach of digitizing error presentation in the Exfor file as official recommendation for compilers** as its values influence on the results of Exfor numeric data processing by the users of Exfor library.

Now we are presenting the base version of InpGraph 3.1. This report and presentation could serve as a brief manual to start using the InpGraph environment.

We will be grateful for any feedbacks and proposals. They all should be taken into account. You could judge about our plans of InpGraph further development by the buttons and menu items that are not available now and have grey color.

Major new features in InpGraph

1. Optional order of digitizing operations.

2. Any number of abscissa and ordinate axes at one plot.

3. MinMax Mode: digitizing of data presented in a form of vertical lines.

4. Err Mass Y, Err Mass XY Modes: digitizing of data presented with error bars.

5. A value of quantization error.