The TINA Graph Digitiser Tool

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TINA
WWW.TINA-VISION.NET

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1 Introduction

The majority of scientific papers publish results in graphical form. Whilst this facilitates interpretation, in many cases it is necessary to have the data in numerical form, for inclusion into meta-studies, or to estimate fits or errors that are not provided in the original paper. In these situations it is preferable to obtain the required data from the original authors: however, this may not always be possible. Digitisation software such as the TINA Digitiser Tool provides an alternative, allowing computer-aided reconstruction of the original data from the graph.

1.1 Limitations

The TINA digitiser tool currently has two main limitations:

- it assumes that the axes are orthogonal and aligned with the horizontal and vertical directions;
- it assumes that the scales are linear on both axes.

These limitations will be corrected as required.

2 Installation

In order to use the TINA Digitiser Tool, you must already have compiled and installed the TINA libraries. See the TINA website

`http://www.tina-vision.net`

for instructions.

The TINA Digitiser Tool can be obtained from the TINA CVS repository using the commands

```
cvs -d :pserver:anonymous@cvs.tina-vision.net:/home/tina/cvs login
(press enter when prompted for a password
cvs -d :pserver:anonymous@cvs.tina-vision.net:/home/tina/cvs co tina-projects/digitiser_tool
```

This should check out the following files to the current directory

```
Makefile: project Makefile.
tinaTool.c: source file for the top-level tinaTool.
tldigiCore_tool.c: source file for the Digitiser Tool.
tldigiCore_tool.h: header file for the Digitiser Tool.
tldigiCore_view.c: source file for the Digitiser Tool Tv functions.
tldigiCore_view.h: header file for the Digitiser Tool Tv functions.
2006-005.pdf: this document.
test_images: various graphs for testing the tool.
```

Then, build the tinaTool. The Makefile distributed with the project may require some manual editing: it assumes that you installed the TINA libraries in the /usr/local/Tina5 directory, and that you are using the Xview widget set. Open the Makefile in an editor, set the TINA-X-GUI variable to specify the widget set you wish to use, and edit any paths that do not apply for your system. Finally, type "make" to build the tinaTool executable, and run it by typing

`./tinaTool`

3   Use of the Digitiser Tool

In order to use the tool, the graph from which you wish to obtain data must be available as a PGM image file. An example, from TINA Memo No. 2004-002, is provided in the test-images directory. Most papers available on the web are in PDF format, and Acroread provides a facility for selecting graphics from within documents and copying them to the clipboard. However, this function seems to be a bit unreliable in Linux (it may work better in the windoze version). Alternatively, you can use the screen-grabber in Xv to extract graphs. If you need to convert an image into PGM from another format use "convert": see the convert man page for instructions.

Once the image of the graph is available, start tinaTool. Click on "Mono" in the top-level window to start the Mono tool, click "New Tvtool" to start a Tv tool, click on the "Mono" button in the Tv list of the Mono tool, and click on "install" in the Tv tool to attach it to the Mono tool Tv. Enter the path and filename of the image into the relevant fields in the Mono tool, select PGM in the "File" list, and click "input". The graph should now be displayed in the Tv tool attached to the Mono Tv.

Click on "Digitiser" in the top-level tinaTool window, click on "New Tvtool", click on the "Digi" button in the Digitiser tool Tv list, and click on "install" in the new Tv tool to attach it to the digitiser Tv. Then click "push" in the Mono tool to send the image to the stack, and click "pop" in the Digitiser tool to load the image into the Digitiser tool. It should now be visible in the Tv tool attached to the Digitiser tool Tv. Click and drag on the corner of Tv tool to enlarge it to a convenient size (make sure that the Tv tool does not overlap the Digitiser tool window, as this will make the tool inconvenient to use) and click "init" in the Tv tool to expand the size of the image to fit the window.

At this point you can begin to select elements of the graph. This is done using the "Mouse" menu in the Digitiser tool. Right click and hold with the mouse pointer over the "digi" field in the "Mouse" list. A drop-down menu will appear. Drag the mouse pointer down to the x-axis option and release the mouse button. You should see "X-AXIS: X/null/null" appear at the top of the Tv tool attached to the Digitiser tool Tv. Now place the mouse cursor over the start point of the x-axis in the image and hold down the left mouse button. Drag the cursor over to the end point of the x-axis, and release the left mouse button. The x-axis will be displayed as a coloured line overlaid on the graph, with points at the start and end points. Next, repeat this for the y-axis, using the y-axis option in the mouse list. Finally, select the points option in the mouse list, the left-click on each data point in the image in turn. A red cross will be placed over each selected point.

These operations can be performed in any order, and the selection of the axes can be repeated as many times as needed to adjust the position. If a mistake is made in selecting the data points, the last point selected can be removed be clicking "Clear last point". This button can be used repeatedly to remove the points in the reverse order to that in which they were selected, or clicking "Clear points" will clear all of the points selected so far. All of the graph elements are displayed as an overlay plane, which will be lost if focus is switched to another window[1] or if you repaint the Digitiser Tv tool[2]. However, the graph elements selected so far can be re-displayed by clicking on "Redraw all". Note that loading a new image into the Digitiser tool or clicking "init" in the Digitiser Tv tool will re-initialise the tool and remove all selected axes and points.

Once you have finished selecting elements from the graph, you need to enter the values of the start and end points of both of the axes you selected into the "X Start", "X End", "Y Start" and "Y End" fields. These values are used to calibrate the data. The data can then be output to a text file the location of which is specified in the "Directory" and "File name" fields by pressing the "Output data to file" button.

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[1]I.e. if you use another program during the process

[2]Pressing "repaint" in the Tv tool or moving another Tina window across it will repaint the display: this is why the Digitiser tool window should not overlap the Digitiser Tv tool window, as you will be switching focus back and forth between them whilst using the tool

4   Quick Reference

- TV list:

  - Digi: Sets the Digitiser Tool Tv as the current Tv, for installation onto a Tv Tool.

- Mouse list:

  - null choice: disassociate the mouse from the Digitiser tool functions.
  - x-axis choice: set the left mouse button to specify the x-axis.
  - y-axis choice: set the left mouse button to specify the y-axis.
  - points choice: set the left mouse button to enter data points.

Image Entry:

- Push button: push the image currently loaded into the Digitiser tool onto the Imcalc stack.

- Pop button: load the image currently on the top of the Imcalc stack into the Digitiser tool.

Data Entry:

- Clear Points button: deselect all points.

- Clear last point button: deselect individual points, in the reverse order.

- Redraw All button: redraw all currently selected points and axes.

- X Start field: enter the value of the starting point of the x-axis.

- X End field: enter the value of the end point of the x-axis.

- Y Start field: enter the value of the starting point of the y-axis.

- Y End field: enter the value of the end point of the y-axis.

Data Output:

- Directory field: specify the directory for the output file.

- File field: specify the name of the output file.

- Output data to file button: output all selected points into the file specified by the above fields.