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# **Data Digitizer Documentation**

***Release 1.2.1***

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## GETTING STARTED

### 1.1 Description

DataDigitizer is a simple graphical tool for digitizing data from images.

In terminal enter the following command:

```
python -m datadigitizer
```

The cursor is used to point a specific position in the graph whereas all operations are done through keyboard combinations or through the main menu.

Legend:

- Red crosses are data points
- Blue crosses are Xmin and Xmax
- Green crosses are Ymin and Ymax

Commands:

- <Ctrl-o> for loading image.
- <Ctrl-a> add data point.
- <Hold a+Left Click> add data point.
- <Left Click> select a data point.
- <Hold Ctrl+Left Click> multiple data point selection.
- <Ctrl-g> set Xmin from last data point or from selected data point.
- <Ctrl-h> set Xmax from last data point or from selected data point.
- <Ctrl-j> set Ymin from last data point or from selected data point.
- <Ctrl-k> set Ymax from last data point or from selected data point
- <Ctrl-l> set all limits from last 4 data points or from last 4 selected data points.
- <Ctrl-n> remove all limits.
- <Ctrl-z> remove last data point.
- <Ctrl-d> remove selected data point.
- <Ctrl-D> remove all data points.
- <Ctrl-m> compute the data points.
- <Ctrl-t> view data table.
- <Ctrl-s> save data points.
- <Ctrl-w> clear all.

A pdf version of the documentation can be found here [DataDigitizer](#). The source code can be viewed on [GitHub](#).

## 1.2 How to install

```
$ python setup.py install  
  
or  
  
$ pip install datadigitizer
```

## 1.3 Dependencies

```
numpy>=1.20  
matplotlib>=3.4.0  
Pillow>=9.0.0
```

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## 2.1 Simple Extraction

### 2.1.1 Open the app

Start the application by entering in the terminal:

```
python -m datadigitizer
```

The main windows looks like in figure *Main Window*

A quick overview of the different commands is shown in **Help->How to use**.

### 2.1.2 Load the image

Load an image from which you want to extract data by pressing <Ctrl-o> or from **File->Load Image**. Browse to the image and click OK.

### 2.1.3 Position XY Limits

Position 4 crosses for the axis limits in the order Xmin, Xmax, Ymin, Ymax by pointing them with the mouse and adding them by pressing <Ctrl-a>. You can hold down <a>, point with the mouse and left click for adding a red cross.

### 2.1.4 Set XY Limits

Press in the order <Ctrl-k>, <Ctrl-j>, <Ctrl-h>, <Ctrl-g>. It will set the Ymax, Ymin, Xmax and Xmin from the last (selected) data point, respectively.

- When <Ctrl-k> is pressed, the last of the 4 red crosses will become the Ymax value and will be colored in blue.
- When <Ctrl-j> is pressed, the last of the 3 red crosses will become the Ymin value and will be colored in blue.
- When <Ctrl-h> is pressed, the last of the 2 red crosses will become the Xmax value and will be colored in green.
- When <Ctrl-g> is pressed, the last red cross will become the Xmin value and will be colored in green.

You can set the XY limits in the different order if needed and you can also set all the limits at once from the last (selected) 4 data points (red crosses) by pressing <Ctrl-l>.

It is also possible to select a limit with a left click and adjust it by pressing left, right, up and down.

The limits can be reverted to data by pressing <Ctrl-n>.

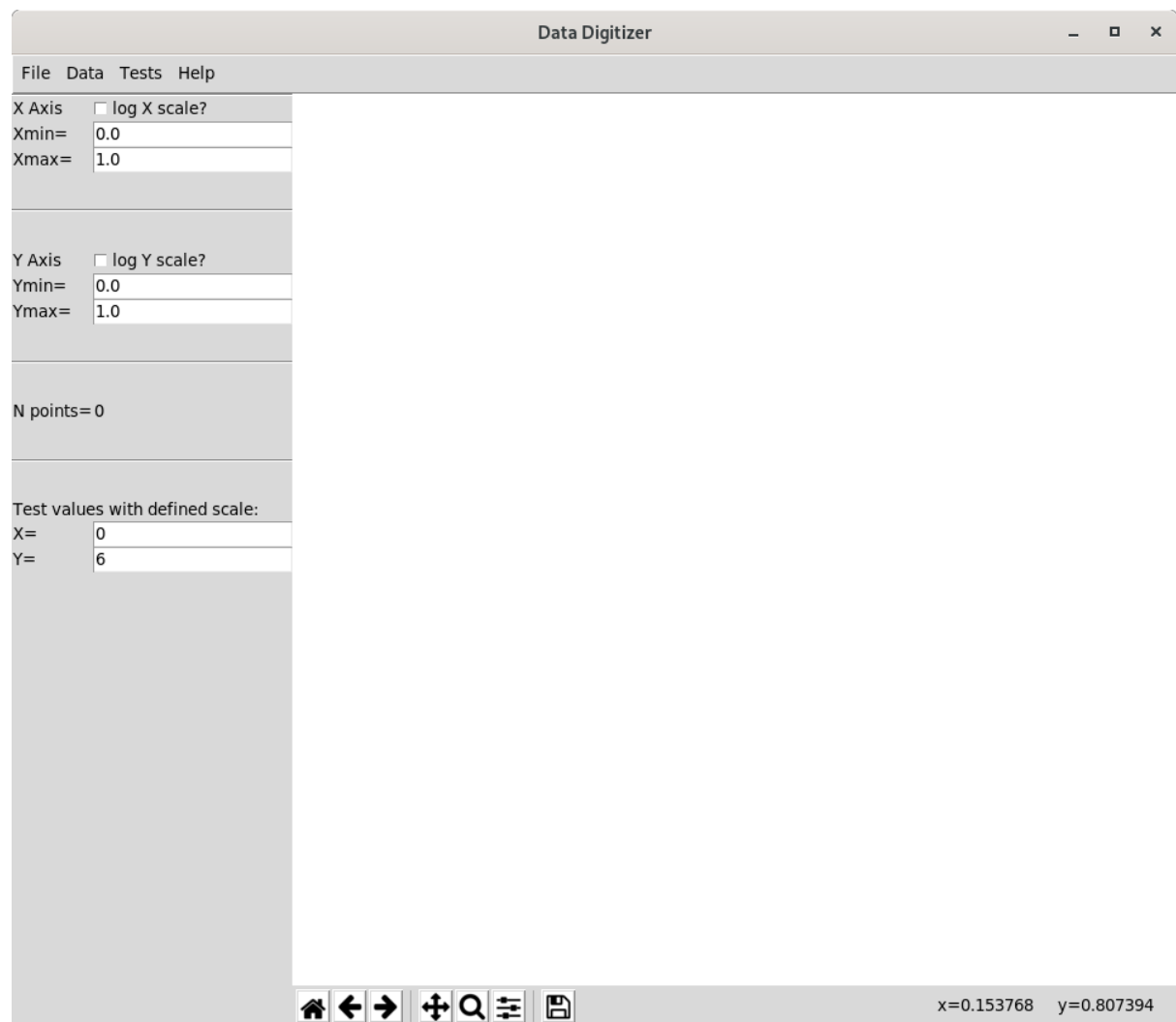


Fig. 1: Main Window

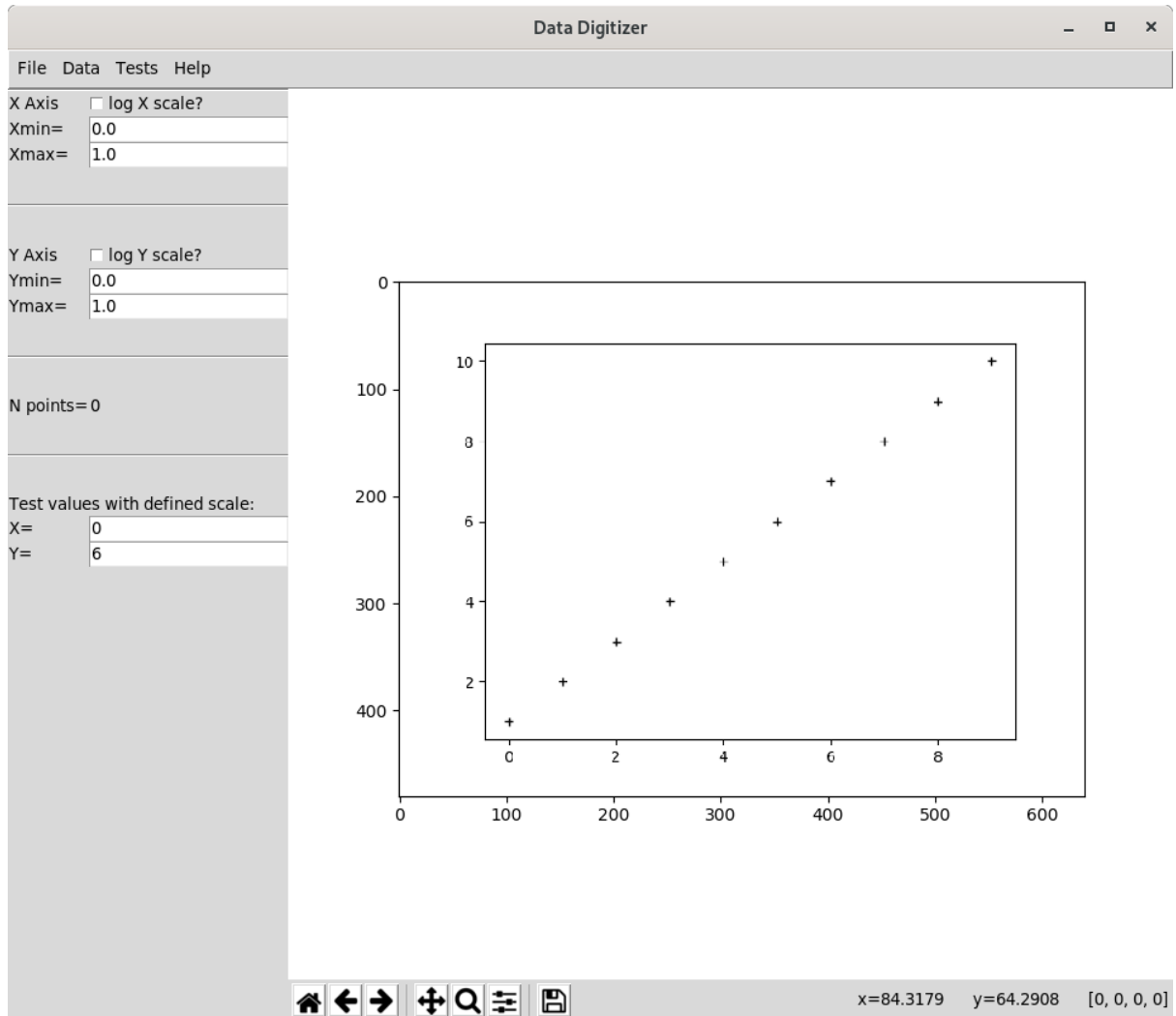


Fig. 2: Load the image from which to extract data

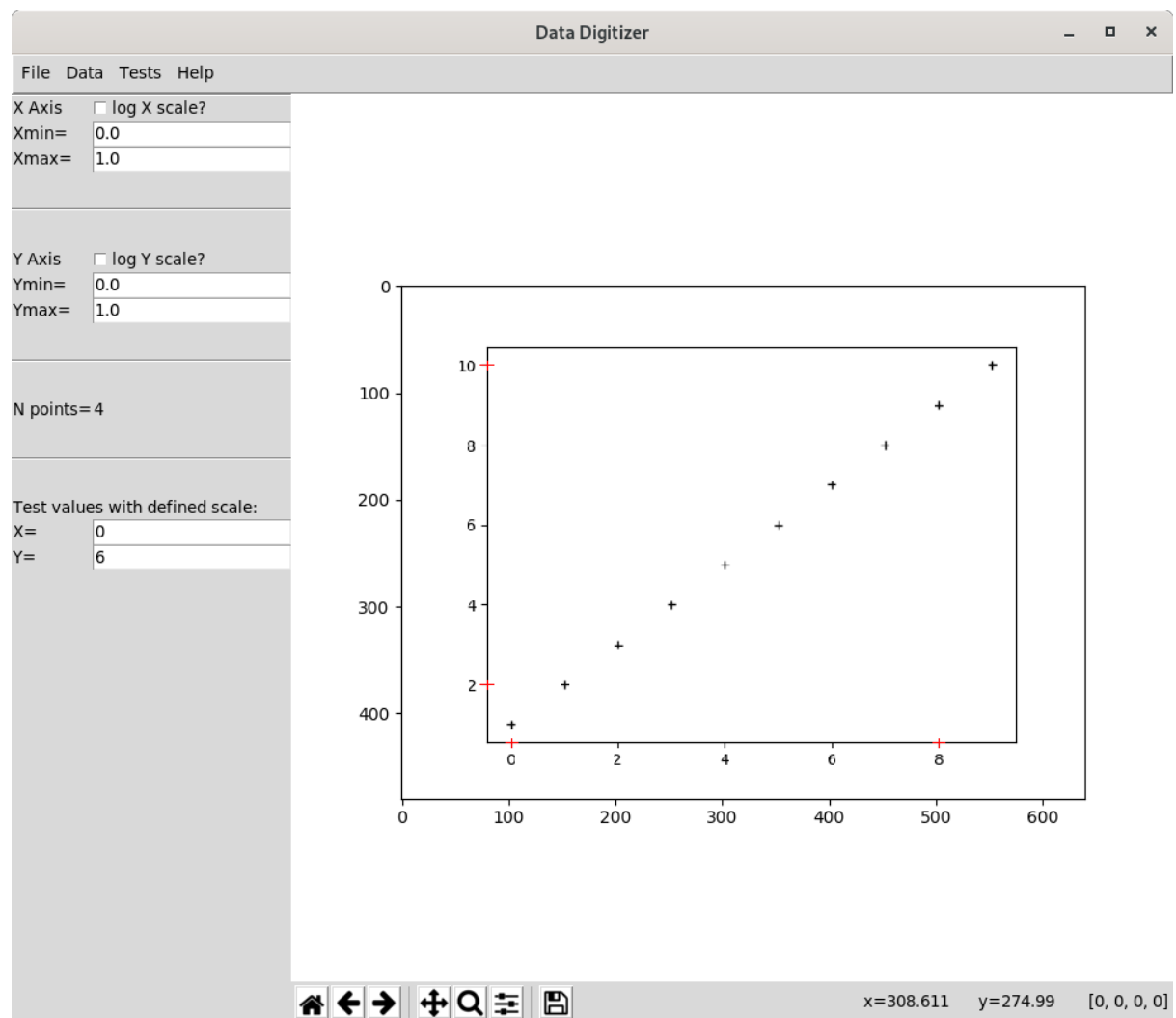


Fig. 3: Position limits for x and y axes

All shortcuts commands are also available through the menu Data.

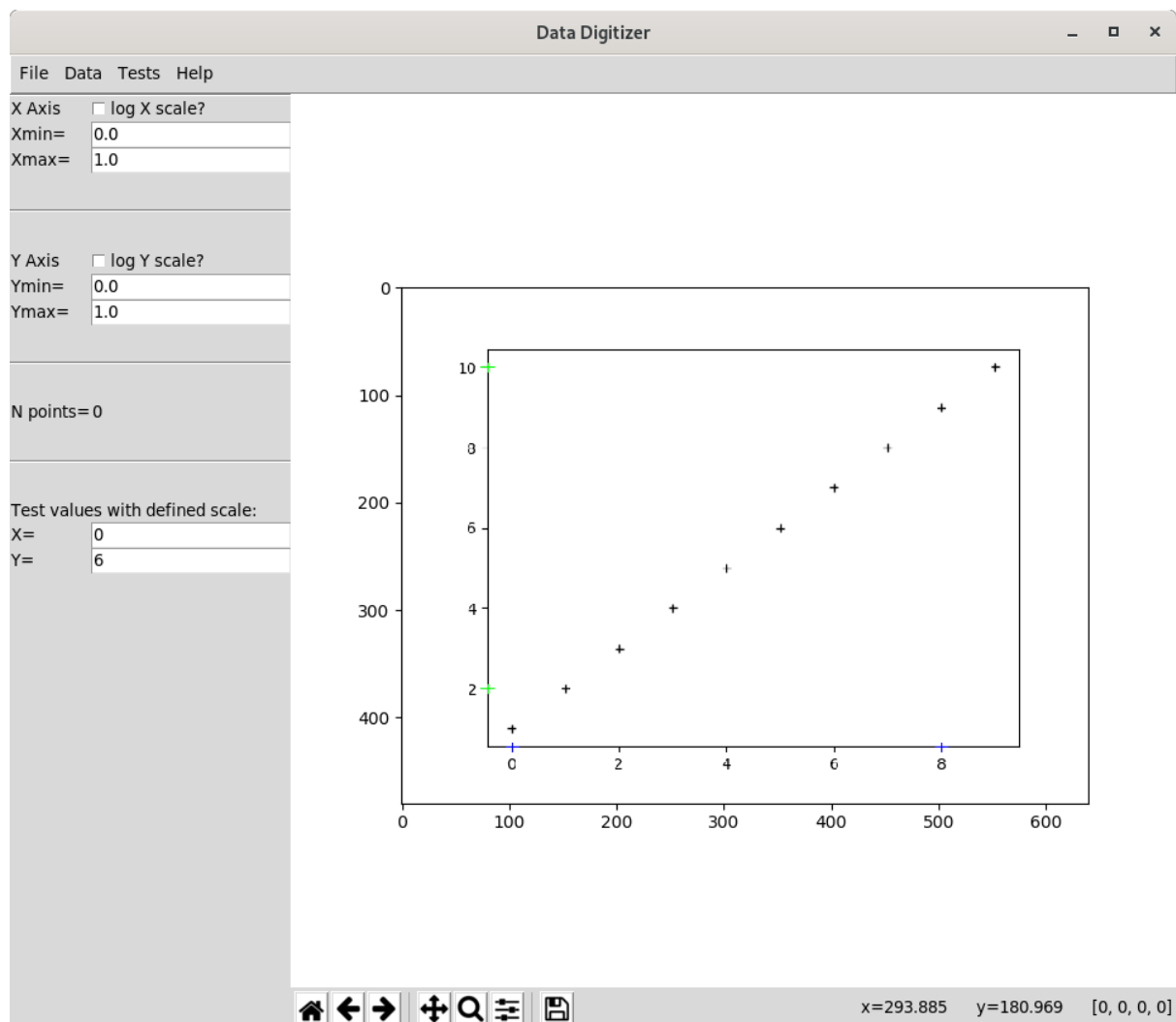


Fig. 4: Set XY limits

## 2.1.5 Enter XY Limits

Enter the corresponding value for Xmax, Xmin, Ymin and Ymax and press <Enter>. Switch to log scales if needed.

## 2.1.6 Add Data Points

Add data points by pointing them with the mouse and adding them by pressing <Ctrl-a>. You can hold down <a>, point with the mouse and left click for adding a red cross. Once a data point is added you can adjust its position by pressing left, right, up and down arrows. Press <Ctrl-m> or from the menu Data->Compute to compute the data with the defined XY scales. Press <Ctrl-s> or from the menu File->Save Data to save data.

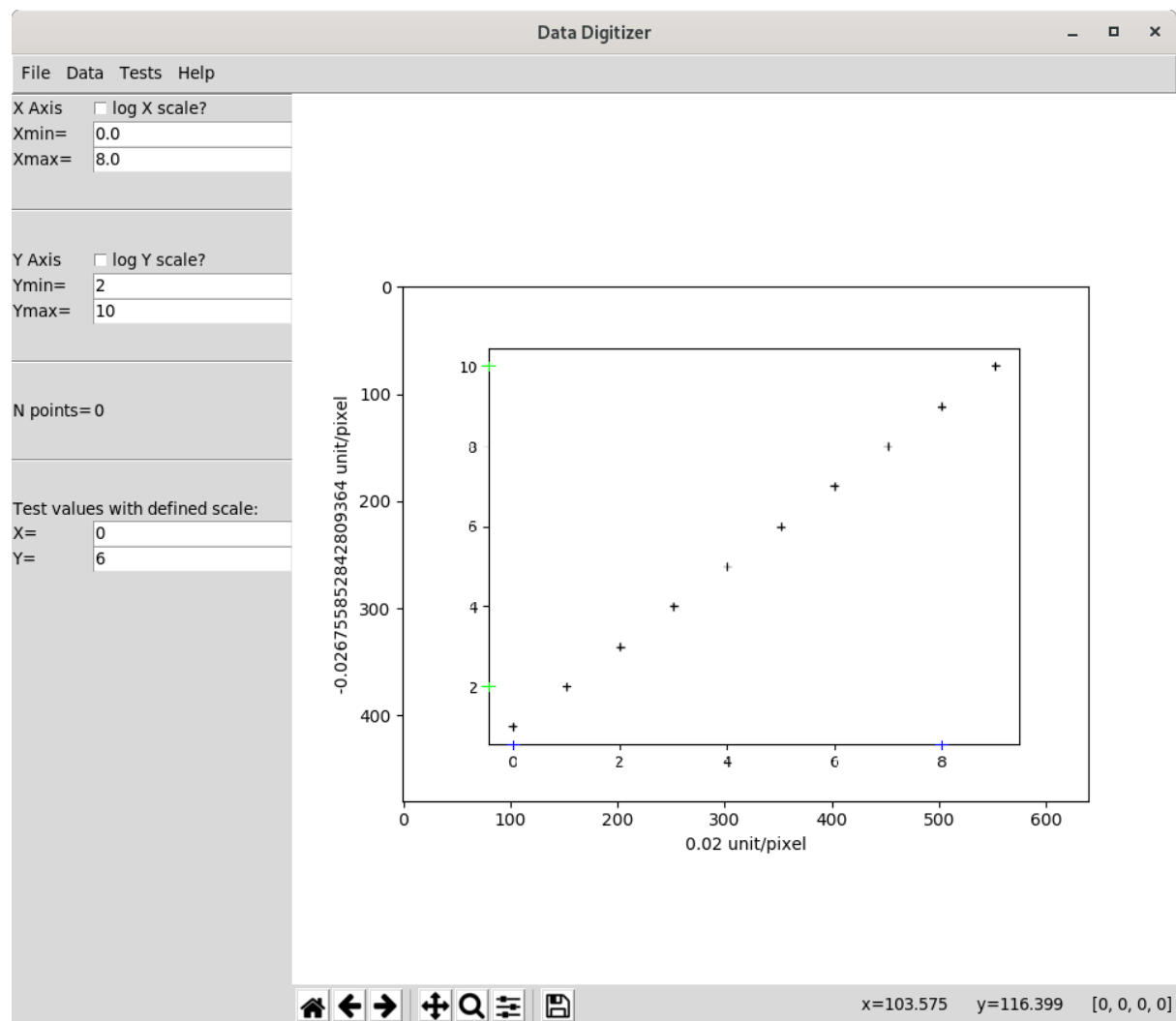


Fig. 5: Enter XY values



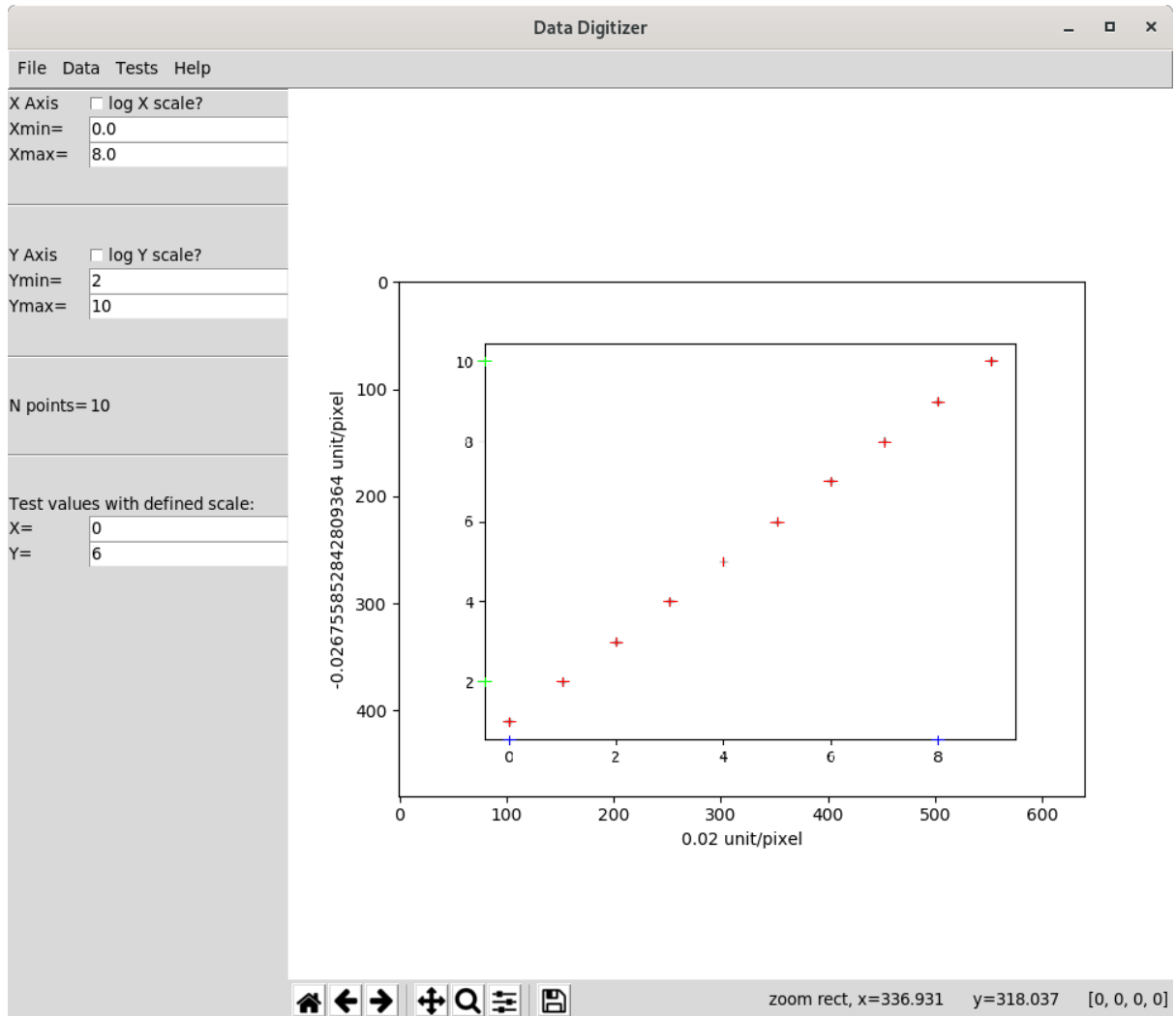
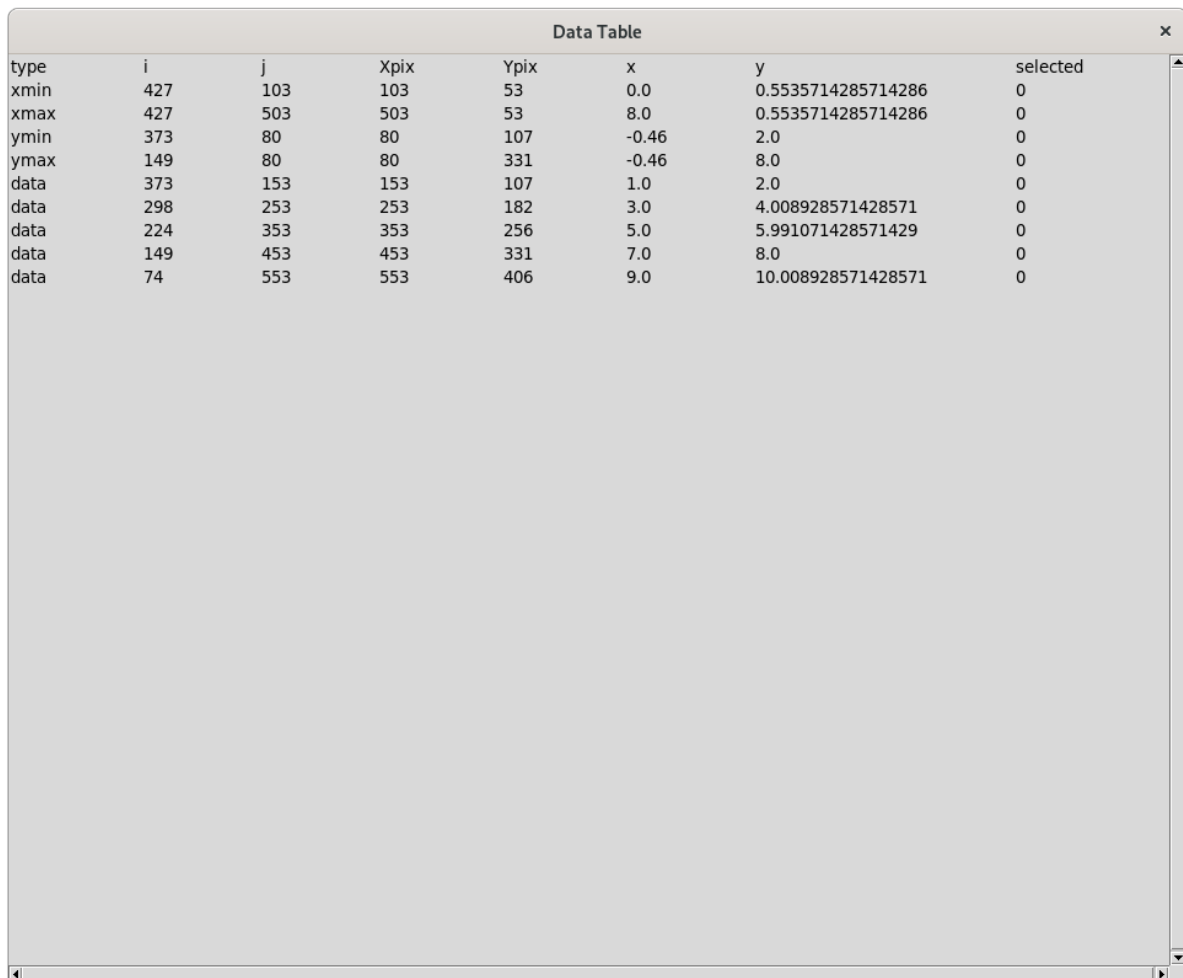


Fig. 6: Set data values

## 2.1.7 View Data Points

The data values can be seen by pressing <Ctrl-t> or through the menu Data.



The screenshot shows a window titled "Data Table" with a close button (X) in the top right corner. The window contains a table with 8 columns: type, i, j, Xpix, Ypix, x, y, and selected. The table lists various data points, including minimum and maximum values for x and y, and several individual data points with their coordinates and a 'selected' status (all are 0).

type	i	j	Xpix	Ypix	x	y	selected
xmin	427	103	103	53	0.0	0.5535714285714286	0
xmax	427	503	503	53	8.0	0.5535714285714286	0
ymin	373	80	80	107	-0.46	2.0	0
ymax	149	80	80	331	-0.46	8.0	0
data	373	153	153	107	1.0	2.0	0
data	298	253	253	182	3.0	4.008928571428571	0
data	224	353	353	256	5.0	5.991071428571429	0
data	149	453	453	331	7.0	8.0	0
data	74	553	553	406	9.0	10.008928571428571	0

Fig. 7: View data table

## 2.2 Test Scale Values

It is also possible to test the X/Y scales by entering values, e.g. X=0 and Y=6, press <Enter> to check if the scales are properly set.

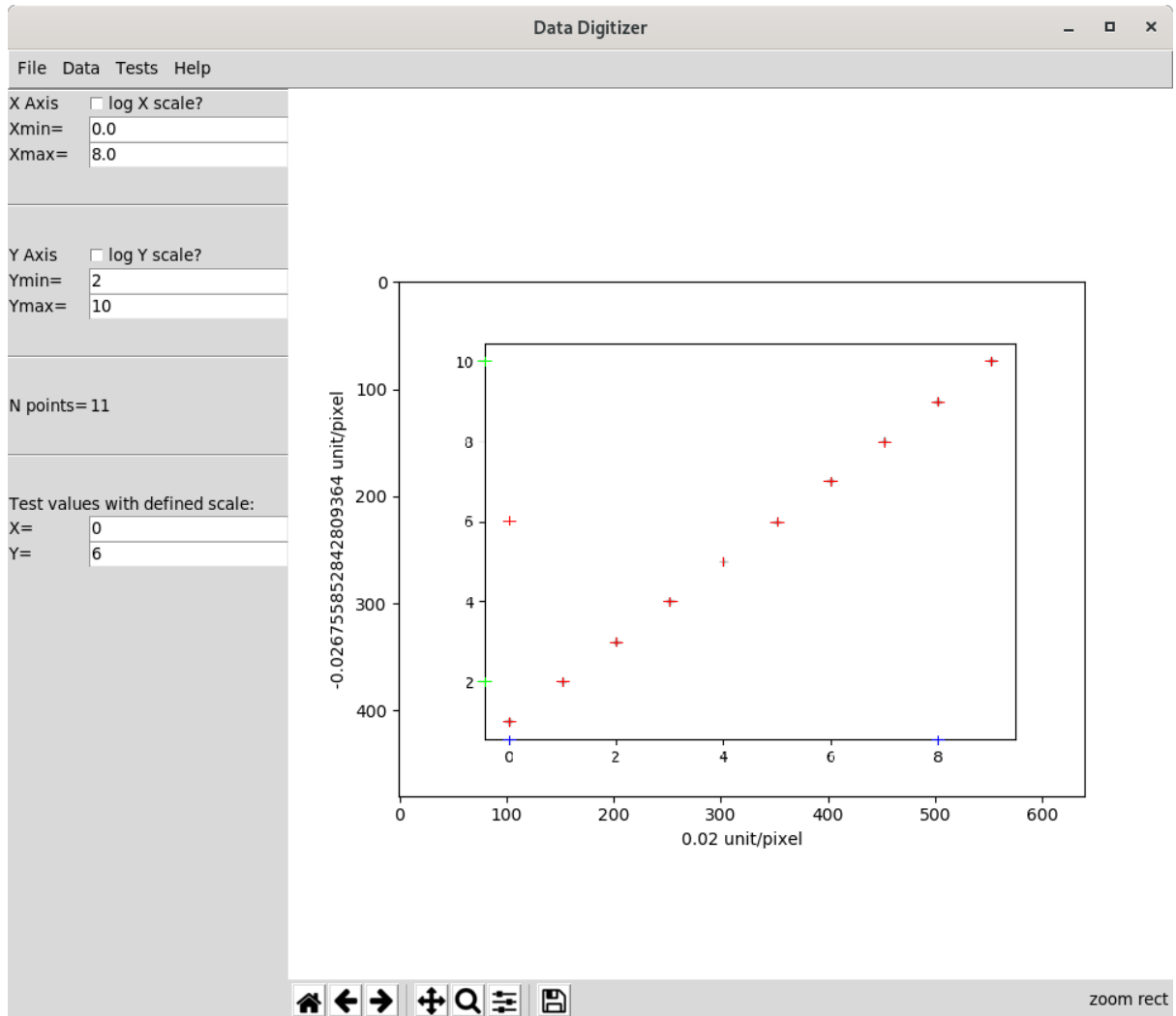


Fig. 8: Test scale



## RELEASE NOTES

### 3.1 Data Digitizer 1.2.0 Release Note

#### 3.1.1 Changes

Change of numpy minimum version from 1.17 to 1.20 for taking advantage of the typing module.

Change of matplotlib minimum version from 3.0 to 3.4 for taking advantage of new features.

Simplify the settings in init file.

#### 3.1.2 Download

PyPI

#### 3.1.3 Contributors

Milan Skocic

#### 3.1.4 Commits

Full Changelog: <https://github.com/MilanSkocic/PyDatadigitizer/compare/1.1.2...1.2.0>

### 3.2 Data Digitizer 1.1.2 Release Note

#### 3.2.1 Changes

Minor fixes in documentation.

#### 3.2.2 Download

PyPI

### 3.2.3 Contributors

Milan Skocic

### 3.2.4 Commits

Full Changelog: <https://github.com/MilanSkocic/PyDatadigitizer/compare/1.1.1...1.1.2>

## 3.3 Data Digitizer 1.1.1 Release Note

### 3.3.1 Changes

Minor fixes in documentation.

### 3.3.2 Download

PyPI

### 3.3.3 Contributors

Milan Skocic

### 3.3.4 Commits

Full Changelog: <https://github.com/MilanSkocic/PyDatadigitizer/compare/1.1.0...1.1.1>

## 3.4 Data Digitizer 1.1.0 Release Note

### 3.4.1 Highlights

- Data table for visualizing the extracted data values as a toplevel window.
- Documentation bug fixes and improvements.

### 3.4.2 New Features

Data are visible as an array.

### 3.4.3 Download

PyPI

### 3.4.4 Contributors

Milan Skocic

### 3.4.5 Commits

Full Changelog: <https://github.com/MilanSkocic/PyDatadigitizer/compare/1.0.2...1.1.0>

## 3.5 Data Digitizer 1.0.2 Release Note

### 3.5.1 Highlights

- Documentation minor fixes.
- Explicit internal functions for converting (i,j) array indexes to (xpix, ypix) graph indexes
- Added data folder as an option for folder profile.

### 3.5.2 Future Changes

The data table will be visible in version 1.1 during the process of drawing data from the shortcut <Ctrl-t> or through the menu Data->View Data.

### 3.5.3 Compatibility notes

The full data array is now saved instead of (x, y) columns only. This changes does not bring any compatibility issue but it is worth mentionning that the format has changed.

### 3.5.4 Download

PyPI

### 3.5.5 Contributors

Milan Skocic

### 3.5.6 Commits

#c90ebea-MilanSkocic-ENH: Conversion as private functions

#be87095-MilanSkocic-ENH: Added conversion functions from i,j matrix indexes to xypix graph pixels

#94d1081-MilanSkocic-ENH: Separated array indexes i,j and pixel indexes in graph

#d39ca8f-MilanSkocic-ENH: Added folder options and full data array save

#5d0150d-MilanSkocic-ENH: Added options in folder profile

#61acb28-MilanSkocic-ENH: Refractoring according to pylint and mypy

## 3.6 Data Digitizer 1.0.1 Release Note

### 3.6.1 Highlights

Documentation minor fixes.

### 3.6.2 Contributors

Milan Skocic

### 3.6.3 Commits

[#12ea7cb](#)-MilanSkocic-DOC: Minor corrections in tutorial.rst.

[#b171b83](#)-MilanSkocic-DOC: Minor corrections in tutorial.

## 3.7 Data Digitizer 1.0.0 Release Note

### 3.7.1 Highlights

Initial release with basic features:

- Import image
- Set scale
- Multiple selection of data points
- Compute and save data

### 3.7.2 Contributors

Milan Skocic

### 3.7.3 Commits

[PR#5](#)-BUG: Fixed unwanted autoscale for each draw of the image threshold.

[PR#4](#)-ENH: New features with interactive points

[PR#3](#)-ENH: Cleanup.

[PR#2](#)-ENH: Added tests in the main app.

[PR#1](#)-ENH: Added tests.

[#63fa293](#)-Implementing FigureFrame in main app.

[#6b25247](#)-Initial commit with functional GUI and basic functions for adding points.



## AUTOGENERATED DOCUMENTATION

### 4.1 Graphical FrontEnd

Main GUI.

```
class datadigitizer.gui.AboutWindow(master)
```

About window.

#### Parameters

**master:** tkinter widget

Container.

```
class datadigitizer.gui.App(master=None)
```

The cursor is used to point a specific position in the graph whereas all operations are done through keyboard combinations or through the main menu.

Legend:

- Red crosses are data points
- Blue crosses are Xmin and Xmax
- Green crosses are Ymin and Ymax

Commands:

- <Ctrl-o> for loading image.
- <Ctrl-a> add data point.
- <Hold a+Left Click> add data point.
- <Left Click> select a data point.
- <Hold Ctrl+Left Click> multiple data point selection.
- <Ctrl-g> set Xmin from last data point or from selected data point.
- <Ctrl-h> set Xmax from last data point or from selected data point.
- <Ctrl-j> set Ymin from last data point or from selected data point.
- <Ctrl-k> set Ymax from last data point or from selected data point
- <Ctrl-l> set all limits from last 4 data points or from last 4 selected data points.
- <Ctrl-n> remove all limits.
- <Ctrl-z> remove last data point.
- <Ctrl-d> remove selected data point.
- <Ctrl-D> remove all data points.
- <Ctrl-m> compute the data points.

- <Ctrl-t> view data table.
- <Ctrl-s> save data points.
- <Ctrl-w> clear all.

### Parameters

**master: tkinter.Tk instance**  
Root instantiation of tkinter.

### Methods

<code>run()</code>	Start the application.
<code>stop()</code>	Stop the main tk loop.

**run()**  
Start the application.

**stop()**  
Stop the main tk loop.

**class** `datadigitizer.gui.DataTable(master, **kwargs)`  
Scrolled data table widget.

### Parameters

**master: tkinter widget**  
Master container.

**kwargs: dict, optional**  
Keyword arguments for the scrolled frame.

### Methods

<code>set_new_data(data)</code>	Set new data in the displayed data table.
---------------------------------	---

**set\_new\_data(data)**  
Set new data in the displayed data table.

### Parameters

**data**  
[structured array, shape=(n,)] Numpy structured array used for registering the extracted data.

**class** `datadigitizer.gui.DataWindow(master)`  
How to use window.

### Parameters

**master: tkinter widget**  
Container.

**class** `datadigitizer.gui.FigureFrame(master, **kwargs)`  
Tk frame encapsulating a matplotlib figure and a toolbar.

### Parameters

**kwargs: dict, optional**  
Keyword arguments for the tk frame.

## Methods

<code>refresh()</code>	Refresh the plot.
------------------------	-------------------

### `refresh()`

Refresh the plot.

**class** `datadigitizer.gui.HowToUse(master)`

How to use window.

#### Parameters

**master: tkinter widget**

Container.

**class** `datadigitizer.gui.ScrolledFrame(master, **kwargs)`

Scrolled Frame widget which may contain other widgets and can have a 3D border.

#### Parameters

**master: tkinter widget**

Master container.

**kwargs: dict, optional**

Keyword arguments for the scrolled frame.

#### Attributes

`canvas`

Return the canvas that contains the scrollbars.

`frame`

Return the frame that contains the widgets.

#### property `canvas`

Return the canvas that contains the scrollbars.

#### property `frame`

Return the frame that contains the widgets.

**class** `datadigitizer.gui.Transform(values_min: float, values_max: float, pix_min: int | float, pix_max: int | float, which: str = 'linear')`

Transform class converting values coordinates into pixel coordinates.

#### Parameters

**values\_min: int, float**

Minimum value.

**values\_max: int, float**

Maximum value.

**pix\_min: int, float**

Minimum pixel.

**pix\_max: int, float**

Maximum pixel.

**which: str, optional**

Which kind of transform i.e. linear or log.

#### Attributes

`backward_scale`

Return the scale for transforming pixels into values.

*forward\_scale*

Return the scale for transforming values into pixels.

**Methods**

<i>backward</i> (x)	Transform pixels to values.
<i>forward</i> (x)	Transform values to pixels.

**backward**(x: *int* | *float* | *ndarray*)

Transform pixels to values.

**Parameters**

**x: int or floats or array-like, shape(n,)**

Pixels to be transformed.

**Returns**

**values: int or floats or array-like, shape(n,)**

Values corresponding to the pixels.

**Notes**

$$x = (x_{pix} - x_{pix,min}) \frac{x_{max} - x_{min}}{x_{pix,max} - x_{pix,min}} + x_{min}$$

**property backward\_scale**

Return the scale for transforming pixels into values.

$$\frac{x_{max} - x_{min}}{x_{pix,max} - x_{pix,min}}$$

**forward**(x: *int* | *float* | *ndarray*)

Transform values to pixels.

**Parameters**

**x: int or floats or array-like, shape(n,)**

Values to be transformed.

**Returns**

**pixels: int or floats or array-like, shape(n,)**

Values corresponding to the pixels.

**Notes**

$$x_{pix} = (x - x_{min}) \frac{x_{pix,max} - x_{pix,min}}{x_{max} - x_{min}} + x_{pix,min}$$

**property forward\_scale**

Return the scale for transforming values into pixels.

$$\frac{x_{pix,max} - x_{pix,min}}{x_{max} - x_{min}}$$

## 4.2 Icon

Create icon for the app.

## 4.3 Settings

Settings module.

`datadigitizer.settings.save_cfg()`

Save the configuration file.

## 4.4 Tests

Tests module.

**class** `datadigitizer.tests.TestPlotData(methodName='runTest')`

Create an instance of the class that will use the named test method when executed. Raises a `ValueError` if the instance does not have a method with the specified name.

### Methods

<code>test_linear()</code>	Test linear plot.
<code>test_loglog()</code>	Test log-log plot.
<code>test_xlog()</code>	Test x semi-log plot.
<code>test_ylog()</code>	Test y semi-log plot.

**test\_linear()**

Test linear plot.

**test\_loglog()**

Test log-log plot.

**test\_xlog()**

Test x semi-log plot.

**test\_ylog()**

Test y semi-log plot.

`datadigitizer.tests.test_linear()` → [Path](#)

Generate the linear plot and data.

#### Returns

**fpath: Path object**

Path to the linear plot.

`datadigitizer.tests.test_loglog()` → [Path](#)

Generate the log-log plot and data.

#### Returns

**fpath: Path object**

Path to the log-log plot.

`datadigitizer.tests.test_xlog()` → [Path](#)

Generate the semi-log plot and data.

**Returns**

**fpath: Path object**

Path to the semi-log plot.

`datadigitizer.tests.test_ylog()` → [Path](#)

Generate the semi-log plot and data.

**Returns**

**fpath: Path object**

Path to the semi-log plot.

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