

Getting Started Guide to DataGraph

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Visual Data Tools, Inc.
Chapel Hill, NC

Introduction

The formatting approach in DataGraph may be different than what you are used to from other programs, but is well worth the effort to learn, as you can save lots of time and effort, while creating beautiful custom graphics.

The goal with DataGraph is to eliminate the tedious nature of creating graphs and understanding data. When users out grow spreadsheets, they might feel the need to learn a programming language. In many ways, DataGraph is an intermediate approach. You can think of DataGraph as a visual programming language.

Here we explain some fundamental aspect to DataGraph to get you started with the program, but there is much to the program beyond what we explain here. One of the best ways to learn is to spend some time exploring the menus and trying them out. As you explore, hover over menus and entry boxes to learn more about what they do via a pop-up tool tip.

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Terminology

Objects – A rectangle that is used to represent a single data column, variable, layout setting, or drawing command.

Icon – An image used to indicate the type of object that is located on the left side of the object. Many drawing commands icons are dynamic, custom icons, meaning that the image changes to reflect formatting options.

Data Column – The vertical organizational unit of data. Click a column header to select the column.

Data Row – The horizontal organizational unit of data the spans across columns. Click on any entry to select a row, or record.

Row index – The numerical order of the data that is automatically assigned to each data row, or record. The index is the only column object in any new file and remains at the top of the column list.

Column List – The collective list of column objects contained in the data definition panel on the left of the user interface. This list can be toggled from view by selecting View > Show/Hide Definitions (⌘-D).

Groups – The method used to organize columns, variables, command, and graphs. Groups can be nested to have multiple levels, or a hierarchical data structure.

Data Table – The interface for interacting with data columns and data groups. Each data column and data group has a check box to show/hide contents from the data table.

Global variable – A single value (number, text, date, expression) that is listed in the section below the column list, separated by a sliding bar.

Layout settings – Formatting options that are grouped into three sections: Style settings, Canvas settings, and Axis settings. These three objects are pinned to the top of the object list above the graph.

Drawing command – The method used to draw elements to a graph including plotting, annotating, curve fitting, and drawing functions. The full list of commands is under the Command menu.

Thumbnail – A small image that represents each graph in a file that is used to toggle between them.

Clone – Make an identical copy. For data columns, variables, commands, groups, use standard macOS option-drag to clone. To clone an entire graph, select File > New Graph > Clone Current Graph.

Gear menu – The small gear shaped image that is located on every column, variable, command, thumbnail and group object. Clicking the gear menu to reveal useful actions and shortcuts.

Mask – A logical statement that is used to specify that data to include in a drawing command.

Shared Mask – A logical statement that is used to specify that data for a group of commands.

Control-click – An action where you single click while holding down the control key. The same action can be achieved by a two finger click on a touch pad, or a right click on a mouse.

Getting Data

One of the fastest ways to get data into DataGraph is via copy and paste. You can copy data from a text file or a spreadsheet. To paste, select **Edit > Paste** (⌘-V) or control-click on the data table and click **Paste**. DataGraph will analyze the data to determine the number of columns/rows, the data type for each column, and the presence of column titles.

After pasting, imported columns are highlighted in the data table. Click away from the data table to deselect. Every column has a corresponding object in the column list. An icon indicates the assigned data type on the left of the column object (numbers, text, or dates). If a header row is detected, the column objects will have a name; otherwise, you can type a column name manually.

A built-in row counter indicates the number of rows on the left side of the data table. The row number is the first object in the column list and has the name '#' by default. In a new file, the pasted data will start at row one. If you paste more data to the same rows, you can select any row below the data, but the data type and column names will not change.

Suppose a column is assigned the wrong data type (e.g., numbers assigned text), click the gear menu on the column object, and select **Convert to ...** as needed. Changing the data type does NOT alter the underlying data. If the header was not in row one, hover your mouse over the row that contains the headers: Control-click and select 'Use row to assign column titles'.

DATA GROUPS: Notice how when you click a record the entire row is highlighted. If columns are unrelated, you can organize them into data groups. To add columns to a group, click in the white space to the right of the columns, then drag to highlight the column objects you want to place in the group. Select **Edit > Group** (Control-⌘-G). This action creates a group object with the columns nested in the group. Click the check box on the group to toggle from view.

FILE TYPES: Import a data from a file using **Data > Import File**. You can also open CSV and MS Excel files directly. Control-click on a file in the finder, and select 'Open with DataGraph.' That creates a new DataGraph file containing the data.

- **CSV Files:** CSV stands for comma separated values. These files usually import easily given the structured format of the data.
- **MS Excel Files:** DataGraph imports columns that contain data. If the data span multiple tabs, DataGraph imports each tab into a data group. Cells with formulas are imported as numbers.

IMPORT

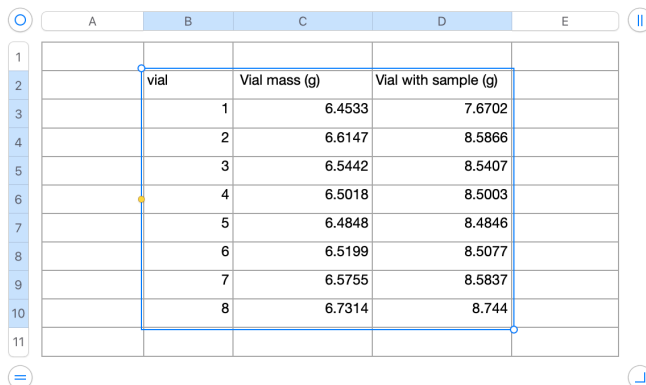
Text
CSV
MS Excel
CricketGraph
Matlab (-v4)
NetCDF

Lesson 1 – Import with Copy & Paste

Copy and Paste is a quick way to import data into a DataGraph file.

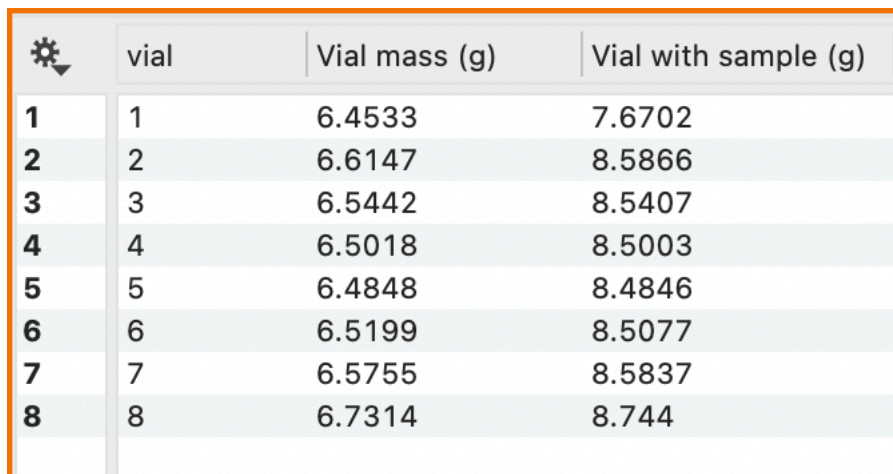
Consider the following example where three columns of numbers are a spreadsheet.

To copy, click a corner of the data and drag to highlight, Next, select **Edit > Copy (⌘-C)**.



	A	B	C	D	E
1					
2		vial	Vial mass (g)	Vial with sample (g)	
3		1	6.4533	7.6702	
4		2	6.6147	8.5866	
5		3	6.5442	8.5407	
6		4	6.5018	8.5003	
7		5	6.4848	8.4846	
8		6	6.5199	8.5077	
9		7	6.5755	8.5837	
10		8	6.7314	8.744	
11					

When you paste the data, DataGraph checks the first row for column titles. Here you can see how the first row was used for the column header and first row of numbers, becomes the first row in the data table.



	vial	Vial mass (g)	Vial with sample (g)
1	1	6.4533	7.6702
2	2	6.6147	8.5866
3	3	6.5442	8.5407
4	4	6.5018	8.5003
5	5	6.4848	8.4846
6	6	6.5199	8.5077
7	7	6.5755	8.5837
8	8	6.7314	8.744

DataGraph vs. the Spreadsheet

Unlike a spreadsheet where columns are named A, B, C. etc. DataGraph allows you to specify the name of every column in your data table. You can double click on the names to edit or use the column list on the left of the interface to edit.

Visualizing Data

Many graphing programs have drawing modes that create particular graph types. The DataGraph approach is different. DataGraph contains 20+ drawing commands that add elements to a graph. Commands can be combined to give you a lot of control and flexibility over the resulting visualization. Add Plots, Bars, Lines, Legends, Labels, Histograms, etc.

To add a command, select **Command > Add ...** or click an icon in the toolbar. Note that the toolbar has several command shortcuts, but the complete list is under the **Command** menu. When you add a command, an object is added just above the graph. This object contains all the options for that command. The icon on the left side represents the type of command.

The main options are visible on the command. These include sliders, color menus, and data menus. Often the main options will be all you need to customize your graph. To reveal more options, click the top left corner of the command. Then you have more options for customizing the type of graph, adding labels, and editing legend entries.

Input data is selected using data menus. Click a data menu to select or edit the data input. When columns are nested in groups, you must scroll to the group to choose from its contents. Hover over a menu item, and a green arrow points to the corresponding entry in the column list. Many commands will not draw anything until the input has been selected.

For some commands, you can pre-select the data to populate the input data menus automatically. For example, the menus will be populated automatically for the **Plot**, **Points** and **Fit** commands when you have two number columns selected before you add the command(s).

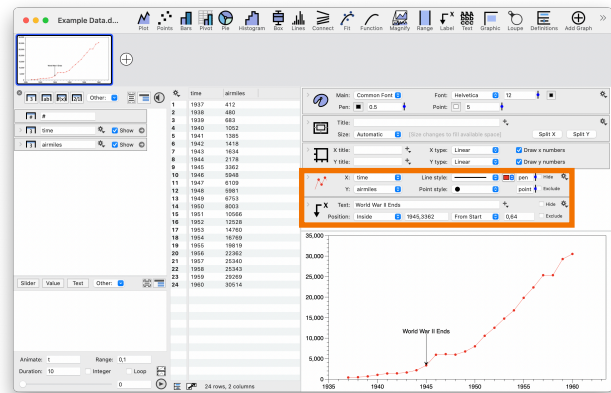
HIDE & EXCLUDE: Each command is a drawing layer. Click and drag the command up and down to change the drawing order. Commands have 'Hide' and 'Exclude' check boxes on the right side. The Hide button hides the element from view. The Exclude button ignores the command completely and may result in the axis range changing.

A NOTE ABOUT MASKS: If you have used spreadsheets for graphing, you may be tempted to select a subset of data by dragging across cells or rows; however, DataGraph has a more robust, data-driven approach to defining a subset – called a mask. The mask is a logical statement used to filter the rows of input data.

To add a mask, expand a command to locate the 'Use as Mask' option, typically in the middle of the command. Here, you can select any column in the data table as a basis for the mask (number, text, or date). Next, select the logic operator. Last, enter criteria for comparison.

Lesson 2 – Add Commands

Add elements to your graph using commands. Click the **Command** menu for the full list. Each command is a distinct visual object above your graph.



Here you see one **Plot** command and one **Label** command. The **Plot** command draws a line using the X Y data, in the columns ‘time’ and ‘airmiles.’ The **Label** command has a text box where a label can be typed directly. You can type the label location or click and drag on the graph to point out locations on the line.

X:

Y:

Line style:

Point style:

pen Hide

point Exclude

Text:

Position:

Hide

Exclude

X:

Y:

Line style:

Point style:

pen Hide

point Exclude

Connect:

Line type:

Fill style:

Fill:

Use as mask:

Labels:

Label font:

Label offset:

Plot offset:

Legend name:

Error bars:

Bridge gaps in data

Type:

Between:

Every Point

Overwrite:

Show in hover

Crop x values:

In legend

Click the top left corner of a command to reveal additional options. You can add a mask to filter the data, add labels for each point, and change the legend entry.

Formating a Graph

The drawing commands control the content in a graph, while the **Layout settings** control the design, similar to a style sheet. In many graphing programs, graphic design is combined with the presentation of the data. By separating the content and the design, format options can be propagated across multiple graphs, saving you considerable time and effort by not having to repeat steps over and over again.

DataGraph also uses the concept of ‘cascading’ formatting, meaning that an overall setting applies to all elements in a graph. Still, you can specify different formatting options for individual elements, giving you complete control over your graphic.

That said, considerable effort has gone into DataGraphs default settings, so you get a nice, clean-looking graphic without having to spend a lot of effort. Many options are set to ‘automatic’ or ‘nice’ and vary dynamically to produce a nice-looking graph as you change other settings (e.g., font size).

In DataGraph, the Layout settings contain the formatting options and are divided amount the following three objects:

- **Style** settings, control font, color pallets, gridlines
- **Canvas** settings, control background colors, margins
- **Axis** settings, control tick mark locations, and axis labels.

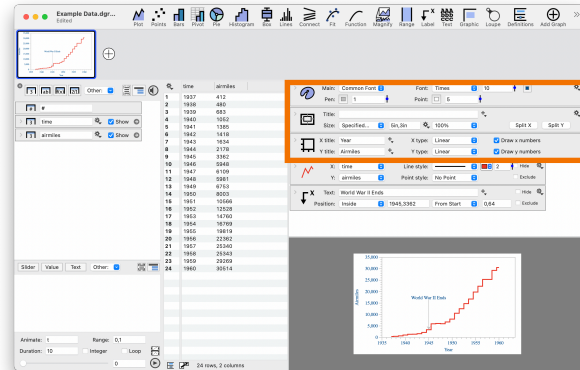
FONTS: The top line of the Style settings controls the main font. Use the main font to change the font style, size, and color, for all text elements at once. Expanding the settings reveals several customizable font groups (e.g., axis labels, axis titles, data labels). Expand individual commands to change the font group or specify custom settings.

COLORS: The Style settings also control the colors. Click the color tiles to change the default font color and line color. Expanding the settings reveals the color tiles for the color menu. In individual commands, you can choose from the color menu or select the color picker to customize independently from the color menu.

GRAPH SIZE: The Canvas settings have options for changing the size of the graph. By default, the size of the graph varies depending on the draggable edges or sliders. To set the size, change the size menu from ‘Automatic’ to ‘Specified’. A new entry box appears. Enter the width and height of the graph along with a unit of measure (in, cm, mm, px). If you do not include a unit of measure, it will be assumed to be a pixel.

Lesson 3 – Use Layout Settings

The **Layout settings** are the objects above the commands that control the font, color menu, graph size, axis titles, and more.



The settings are organized in three sections: **Style**, **Canvas**, and **Axis** settings. The settings are similar to a style sheet. Make changes to the format independent of the content drawn using the commands. Use the menus to change the settings, sliders to change numerical values, click the color tiles to change the color settings.

	Main: Common Font Pen: 1	Font: Times Point: 5	10 5	
	Title:	Size: Specified... 5in,3in	100%	Split X Split Y
	X title: Year Y title: Airmiles	X type: Linear Y type: Linear	<input checked="" type="checkbox"/> Draw x numbers <input checked="" type="checkbox"/> Draw y numbers	

	Main: Common Font Pen: 1	Font: Times Point: 5	10 5	
X/Y Title font: Main Axis font: Main Label font: Main Local font: Main	Overwrite: Same Style Overwrite: Same Style Overwrite: Same Style Overwrite: Same Style	Same Same Same Same	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Color Menu:		Presets	<input type="checkbox"/>	
Line styles: 2,4 5,3	8,2,4,2 1,5,2,4	Box style: One Box Axis line: pen	Axis position: Above	
Grid: None Minor grid: None Tick marks: Outside	Line style: pen Line style: pen	Size: Medium <input checked="" type="checkbox"/> Minor <input type="checkbox"/> Mirror <input type="checkbox"/> If no grid	Language: System Decimal: Period Thousand: Opposite	
Style set:	<input type="checkbox"/> <input type="checkbox"/>			

Similar to the commands, expand the settings to reveal more options. Here the **Style** settings show the font groups, tiles to edit the color menu, and many other formatting options. The formatting approach is cascading, as the changes here apply to all text for a group.

Creating Multiple Graphs

By default a DataGraph file contains one graph. A small version of the graph, or thumbnail is shown in the top left. To create a second graph, select **File > New Graph > Standard Graph** or use the '+' symbol to the right of thumbnail. This creates a standard graph, with no content. The style settings for the new graph will match the first graph.

Once you have two graphs, you can click the thumbnails to toggle between them. The thumbnail for the graph you are actively editing will have an outline, indicating it is selected. The selected graph is shown in the larger window (bottom right), and the corresponding layout settings and commands are shown above the graph.

Now that you have two graphs, you can independently change the format for either graph. When you add another new graph, the style settings will match the graph that had been selected. Thus, you can propagate the style settings as you make new graphs.

Another option is to make a complete copy or clone of a graph. To clone the active graph, select **File > New Graph > Clone Current Graph**. This makes an identical copy that you can now edit without changing the original graph.

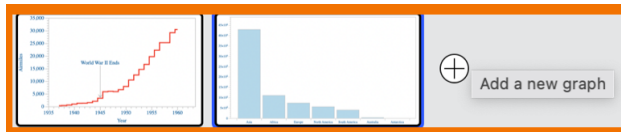
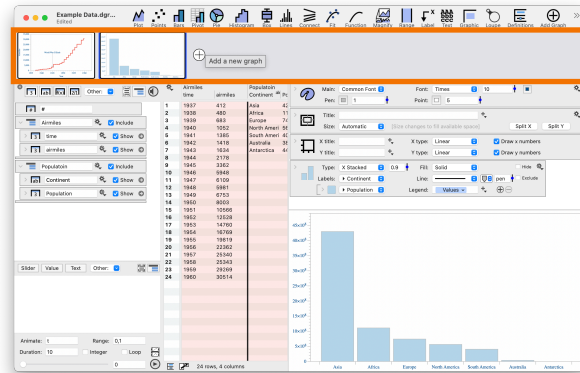
Transfer Settings Between Graphs: Select the layout setting you want to transfer (e.g., single click on the icon). To select multiple settings, click the white space just the right or below the settings, and drag to highlight. With the settings highlighted, select **Edit > Copy** (⌘-C). Next, click the thumbnail of the graph where you want to apply the settings and select **Edit > Paste** (⌘-V). All the format settings will be updated to match the graph they were copied from.

Transfer Settings To All Graphs: Click gear menu on the top right corner of either the Style or Canvas settings. For Style settings, you can chose to 'Set same style' or 'Set same font' for every graph. For the Canvas settings, you can chose to 'Set same canvas' or 'Set same size' for every graph. Changes will propose to all graphs in your file.

Transfer Commands Between Graphs: In the same way that you copy and paste the settings, you can also copy and paste one or more commands between graphs. The difference is that when you paste the commands, new object(s) will be added below the settings or any existing commands. In the target graph, you can select a command in the list before you paste to add the new command(s) below the selected command.

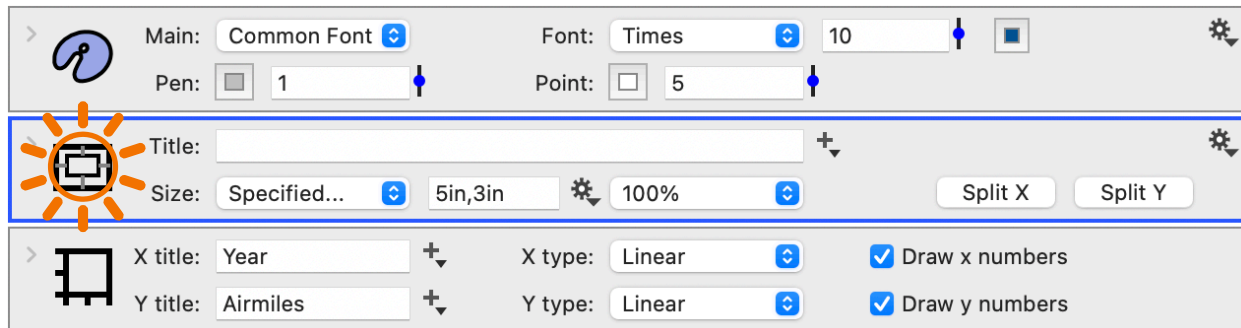
Lesson 4 – Adding Graphs

New DataGraph files have one graph. Click the '+' symbol to the right of the graph to add more graphs. Each graph will have a thumbnail across the top of the interface. Click the thumbnails to toggle between graphs.



The current graph will have an outline around the thumbnail.

Move any settings or commands between graphs. To select, single click on the object icon OR click and drag to select multiple. Select **Edit > Copy**. Next, single click the thumbnail of a different graph. Select **Edit > Paste** to apply.



When you copy and paste settings, the settings in the destination graph are replaced. When you copy and paste commands, the command objects are added to the existing list of commands.

Exporting Images

A quick way to move an image from DataGraph to another program is to use 'Copy and Paste.' First, control-click on the graph window to reveal a context menu. At the bottom of the menu, select **Copy > Copy Figure**. If you need more control, select copy a PDF or bitmap.

Now you can go into other programs and **Paste** (⌘-V). If you choose Copy Figure, DataGraph will paste the best quality graphic, either a vector graphic or bitmap image. If the program accepts a vector graphic, the program will paste a pdf; otherwise, it will paste in a bitmap.

To export the graph to a file, select **File > Export Graphic** (Shift-⌘-E). Here you can edit the file name, destination, and format. Locate the format menu near the bottom left corner. Click the menu to choose the file type you want to export. The top half includes vector graphics formats (PDF, EPS, SVG), and the bottom half provides bitmap formats (PNG, TIF, JPG).

If you choose a bitmap format, you can also change the resolution of the image. A resolution of 72 dpi is standard resolution, while 144 dpi is retina resolution. Unlike a vector image, a bitmap image will show pixels when you zoom closely into the image. If the quality of the image does not look good, you may want to increase the resolution further.

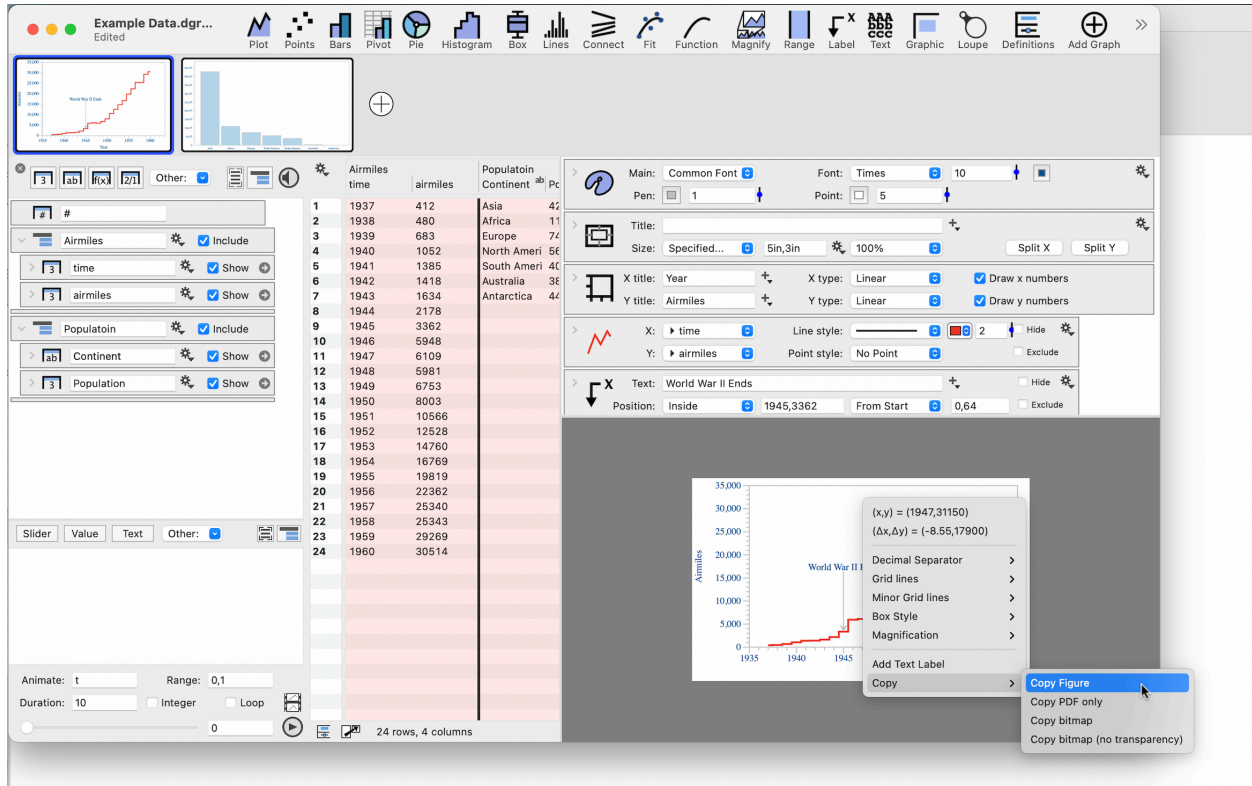
When you export a graph, it will have the name 'Untitled' by default, but you can specify a name using the thumbnail. Hover over any thumbnail, and you will see the word 'Untitled' at the top. Click 'Untitled' once to add a custom title that stays visible. When you export a graph, the custom name is now the suggested name for the file.

You can use the thumbnail of any graph, even when it is not the current graph, to copy or export. Hover your cursor over any thumbnail to reveal the gear menu in the bottom right corner. Click the gear menu and select **Export** or **Copy Image**.

You can also export multiple graphs at once. First, flag the graphs you want to export by hovering over the thumbnail and click the flag symbol (top right corner). Now select **File > Export Flagged Graphs** (Option-Shift-⌘-E). If your graphs do not have unique names, you will get an error. Otherwise, choose a destination folder and click Options to change the file type.

Lesson 5 – Export with Copy and Paste

A quick way to transfer a graph to another program is to use Copy and Paste. Control-click on a graph and select **Copy > Copy Figure**. Go to your destination program to paste the image.



Getting Help

Every object in DataGraph has a directly link to a help article that describes all the option for that data type, layout setting, or command. Click the gear menu on the object and click the HELP option at the bottom of the menu. When the command is expanded, you can get the same link by clicking the '?' in the bottom right corner.