

Dokumentation of Perl Module **Chart**

Chart Group*

January 24, 2006

Version 2.4

*Bundesamt für Kartographie und Geodäsie, Fundamentalstation Wettzell, Sackenrieder Straße 25, D-93444 Kötzing, E-mail: chart@wettzell.ifag.de

Contents

1	Description	2
2	Chart::Base	5
3	Chart::Bars	12
4	Chart::Composite	14
5	Chart::Direction	17
6	Chart::ErrorBars	20
7	Chart::HorizontalBars	23
8	Chart::Lines	25
9	Chart::LinesPoints	27
10	Chart::Mountain	30
11	Chart::Pareto	32
12	Chart::Pie	34
13	Chart::Points	36
14	Chart::Split	38
15	Chart::StackedBars	41

1 Description

SYNOPSIS

```
use Chart::type;      (type is one of: Bars, Composite,
Direction, ErrorBars, HorizontalBars, Lines, LinesPoints,
MountIn, Pie, Points, Split or StackedBars)
```

```
$obj = Chart::type->new;
$obj = Chart::type->new (width, height);
```

```
$obj->set( $key_1, $val_1, ... , $key_n, $val_n);
$obj->set( $key_1 => $val_1, ... , $key_n => $val_n);
$obj->set( %hash );
```

```
#GifGraph.pm-style API to produce png formatted charts
@dt = ( \@xtick_labels, \@dtset_1, ... \@dtset_n);
$obj->png ( "filename", \@dt );
$obj->png ( $filehandle, \@dt );
$obj->png ( FILEHANDLE, \@dt );
$obj->cgi_png ();
```

```
#Graph.pm-style API
$obj->dd_pt ($label, $val_1, ... $val_n);
$obj->dd_dtset ($val_1, ..., $val_n);
$obj->png ("filename");
$obj->png ($filehandle);
$obj->png (FILEHANDLE);
$obj->cgi_png();
The similar functions are available for jpeg
```

```
#Retrieve image information
$obj->set('image' => 'true');
$image_p_ref = $obj->image_dump();
```

The Perl module `Chart` creates 'png' or 'jpeg' output which can be written into a file or output to 'stdout'. Therefore, `Chart` can also create dynamic charts for websites.

It is possible to create a lot of different chart types, i.e., Bars, Composite, Direction, ErrorBars, HorizontalBars, Lines, LinePoints, Mountain, Parallel, Points, Split and StackedBars.

Take a look at their descriptions to see how they work. All of these special types are classes by themselves. All these classes have the same abstract superclass: `Base.pm`. The hierarchy of `Chart` is shown in Figure 1.

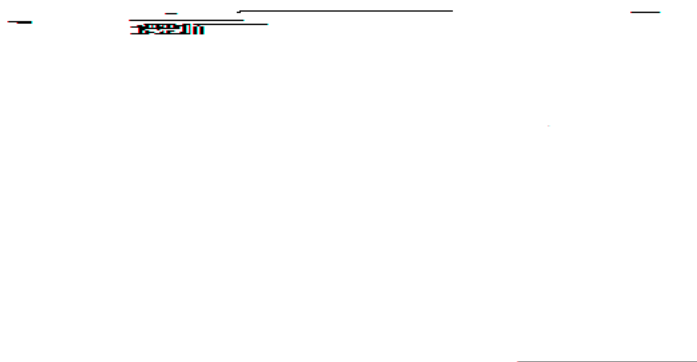


Figure 1: The hierarchy of chart

Therefore, you have to create an *instance of one of the subclasses* to get a chart object.

All these methods and most of the options chart provides are implemented in `Base`. But the drawing of the graph itself happens in the respective subclass. Figure 2 shows the elements of a chart object.

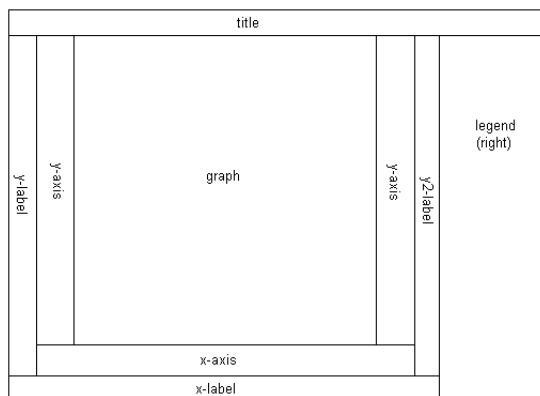


Figure 2: Elements of a chart

The graph area in the middle is drawn by the subclass, all the other elements are drawn by `Base`. But some classes don't need all of these elements or need special elements. Those elements have to be overwritten in the respective class.

For exampl , th class PIE do sn't n d ax s, so th m thods for drawing th ax s in fil 'Bas .pm' ar ov r writt n by m thods in class PIE; in this cas no ax s ar drawn. Furth rmor , th l g nd in a pi chart ar a littl bit diff r nt. Th r for Pi .pm has its own m thods for drawing th l g nds. Th s rul s ar manag d by Chart. You don't hav to att nd to it.

Chart us s Lincoln St in's GD modul for all its graphics primitiv s calls. So you n d a install d v rsion of GD.pm to us Chart. This modul is lik Chart availabl in th CPAN onlin archiv at <http://www.cpan.org/>.

2 Chart::Base

Name: Chart::Bas

File: Bas .pm

Requires: GD, Carp, Fil Handl

Description: BASE is the **abstract superclass** of the modules: Bars, Composite, Direction, ErrorBars, HorizontalBars, Lines, LinesPoints, Mountain, Pareto, Pie, Points, Split, StackedBars.
The class BASE provides all public methods and most of the attributes of a chart object.

Constructor: An instance of a chart object can be created with the constructor `new()`:

```
$obj = Chart::Type->new();  
$obj = Chart::Type->new(width, height);
```

Type means the type of chart it returns, i. e. `Chart::Bars` returns a chart with bars.

If *new()* has no arguments, the constructor returns an object with the size 300x400 pixels. If *new()* has two arguments *width* and *height*, it returns a chart object of the desired size.

Methods:

```
$obj->add_dataset(@array);
```

```
$obj->add_dataset(\@array_ref);
```

Adds a dataset to the object. The parameter is an array or a reference to an array. Generally, the first added array is interpreted as being the x-tick labels. The following arrays include the data points. For example if the first call is `$obj->add_dataset('Harry', 'Sally');` and the second call is `$obj->add_dataset(5, 8);` then chart will draw a picture with two bars and label them with Harry and Sally.

Some modules will handle that a little bit different. Have a look at the respective descriptions of the specific modules to get more information. There are also differences if you want to use the `xy_plot` option, to create a xy-graph.

```
$obj->add_pt(@array);
```

```
$obj->add_pt(\@array_ref);
```

This is another method to add data to a chart object. An argument can be an array or a reference to an array. If you use this method, chart wants the complete data of one data point.

For example

```
$obj->add_pt('Harry', 5);
```

```
$obj->add_pt('Sally', 8);
```

would create the same graph as the example for `add_dataset` above.

```
$obj->add_datafile( "file", type );
```

```
$obj->add_datafile( $filehandle, type );
```

This method adds the contents of a complete data file to the chart object. *Type* can be 'set' or 'pt'. If the parameter is 'set' then one line in the data file has to be a complete data set. The values of the set has to be separated by whitespaces. For Example, the file contents has to looks like

```
Harry Sally
3 8
2 1
```

If the parameter is 'pt' the lines of the file have to look like the parameter arrays of the **add_pt** method. Which means, the line includes all values of one data point, also separated by whitespaces. For Example:

```
Harry 3 2
Sally 8 1
```

\$obj->get_data();

If you want a copy of the data that has been added so far, make a call to the **get_data** method like

```
$dataref = $obj->get_data();
```

It returns a reference to an array of references to datasets. For Example, you can get the x-tick labels by:

```
x_labels = { $dataref->[0] };
```

\$obj->clear_data();

This is the method to remove all data that may have been entered till now.

\$obj->set(attribut 1 => value 1 , ..., attribute n => value n);

\$obj->set(%hash);

\$obj->set(attribut 1 , value 1 , ..., attribute n , value n);

\$obj->set(@array);

Use this method to change the attributes of the chart object. Set looks for a hash of keys and values or an array of keys and values.

For Example **\$obj->set('title' => 'The title of the image');** would set the title. The same job would do:

```
%hash = ( 'title' => 'The title of the image' );
```

```
$obj->set( %hash );
```

\$obj->png("file");

\$obj->png(\$filehandle);

\$obj->png(FILEHANDLE);

\$obj->png("file", \@data);

This method creates the png file. The file parameter can be the file name, a reference to a filehandle or a filehandle itself. If the file doesn't exist, chart will create a file for you. If there is already a file, chart will overwrite this file. In case of an error, the file is not created.

You can also add the data to the chart object in the png method. The *@data* array should contain references to arrays of data, with the first array reference pointing to an array with x-tick labels. *@data* could look like

```
data = ( ['Harry', 'Sally'], [5, 8], [50, 80] );
```

This would set up an graph with two datasets, and three data points in these sets.

\$obj->jpeg("file");

\$obj->jpeg(\$filehandle);

\$obj->jpeg(FILEHANDLE);

```
$obj->jpeg( "file", \@data );
```

These are the methods to create jpeg files. They work similar like the png() method.

```
$obj->cgi_png();
```

```
$obj->cgi_jpeg();
```

With the cgi methods you can create dynamic images for your web site. The cgi methods will print the chart, along with the appropriate http header to stdout, allowing you to call chart-generating scripts directly from your html pages (ie. with a HTML tag).

```
$obj->imagemap_dump();
```

Chart can also return the pixel position information so that you can create image maps from the files Chart generates. Simply set the 'imagemap' option to 'true' before you generate the file, then call the **imagemap_dump** method to retrieve the information. A structure will be returned almost identical to the *@data* array described above to pass the data into Chart.

```
$imagemap_data = $obj->imagemap_dump();
```

Instead of single data values, references to arrays of pixel information is passed. For the classes BARS, HORIZONTALBARS, PARETO and STACKEDBARS charts, the arrays will contain two x-y pairs (specifying the upper left and the lower right corner of the bar). Compare to:

```
( $x1, $y1, $x2, $y2 ) = { $imagemap_data->[$dataset][$datapoint] };
```

For the classes LINES, POINTS, LINESPOINTS and SPLIT, the arrays will contain a single xy-pair (specifying the center of the point). Compare to:

```
( $x, $y ) = { $imagemap_data->[$dataset][$datapoint] };
```

A few caveats apply here. First of all, Chart uses the GD-module by Lincoln Stein to draw lines, circles, strings, and so on. GD treats the upper-left corner of the png/jpeg as the reference point, therefore, positive y values are measured from the top of the png/jpeg, not from the bottom. Second, these values will mostly contain long decimal values. GD, of course, has to truncate these to single pixel values. In a worst-case scenario, this will result in an error of one pixel on your imagemap. If this is really an issue, your only option is to experiment with it, or to contact Lincoln Stein and ask him. Third, please remember that the 0th dataset will be empty, since that's the place for the data point labels.

Attributes/Options:

These are the options which have effects on all types of chart:

'transparent' Makes the background of the image transparent if set to 'true'.

Useful for making web page images. It doesn't work for all browsers. Defaults to false.

'png_border' Sets the number of pixels used as a border between the graph and the edges of the png/jpeg. Defaults to 10.

'graph_border' Sets the number of pixels used as a border between the title/labels and the actual graph within the png/jpeg. Defaults to 10.

'text_space' Sets the amount of space left on the sides of text, to make it more readable. Defaults to 2.

'title' Tells Chart what to use for the title of the graph. If empty, no title is drawn. '\ s' are treated as newlines. Remember, if you want to use normal quotation marks instead of single quotation marks you have to quote "'\n'". Default is empty.

'sub_title' Writes a sub-title under the title in smaller letters.

'x_label' Tells Chart what to use for the x-axis label. If empty, no label is drawn. Default is empty.

'y_label', 'y_label2' Tells Chart what kind of label should be used for the description of the y axis on the left or the right side accordingly. If empty, no label is drawn. Default is empty.

'legend' Specifies the placement of the legend. Valid values are 'left', 'right', 'top', 'bottom'. Setting this to 'none' tells chart not to draw a legend. Default is 'right'.

'legend_labels' Sets the values for the labels for the different datasets. Should be assigned a reference to an array of labels. For example,
`labels = ('foo', 'bar');`
`$obj->set ('legend_labels' => \ labels);`
 Default is empty, in which case 'Dataset 1', 'Dataset 2', etc. are used as the labels.

'tick_len' Sets the length of the x- and y-ticks in pixels. Default is 4.

'x_ticks' Specifies how to draw the x-tick labels. Valid values are 'normal', 'staggered' (stagger the labels vertically), and 'vertical' (the labels are drawn upwards). Default is 'normal'.

'y_ticks' The number of ticks to plot on the y scale, including the end points. e.g. If the scale runs from 0 to 50, with ticks every 10, y_ticks will have the value of 6.

'min_y_ticks' Sets the minimum number of y_ticks to draw when generating a scale. Default is 6, the minimum is 2.

'max_y_ticks' Sets the maximum number of y_ticks to draw when generating a scale. Default is 100. This limit is used to avoid plotting an unreasonably large number of ticks if non-round values are used for the min_val and max_val.

The value for 'max_y_ticks' should be at least 5 times larger than 'min_y_ticks'.

'max_x_ticks', 'min_x_ticks' Works similar as 'max_y_ticks' and 'min_y_ticks'. Of course, it works only for xy-plots!

'integer_ticks_only' Specifies how to draw the x- and y-ticks: as floating point ('false', '0') or as integer numbers ('true', 1). If you want integer ticks, it is maybe better to set the option 'precision' at zero. Default: 'false'

'skip_int_ticks' If 'integrate_ticks_only' was set to 'true' the labels and ticks at the y-axis will be drawn every nth tick. Of course in HorizontalBars it affects the x-axis. Default to 1, no skipping.

'precision' Sets the number of numerals after the decimal point. Affects in most cases the y-axis. But also the x-axis if 'xy_plot' is set and the labels in a pie chart. Default to 3.

'max_val' Sets the maximum y-value on the graph, overriding the normal autoscaling. Does not work for a Split chart. Default is undefined.

'min_val' Sets the minimum y-value on the graph, overriding the normal autoscaling. Does not work for a Split chart. Default is undefined.

Caution should be used when setting 'max_val' and 'min_val' to floating point or non-round numbers. This is because the scale must start & end on a tick, ticks must have round-number intervals, and include round numbers.

Example : Suppose your dataset has a range of 35-114 units, If you specify the same as the 'min_val' & 'max_val', The y_axis will be plotted with 80 ticks every 1 unit.. If no 'min_val' & 'max_val', the system will autoscale the range to 30-120 with 10 ticks every 10 units.

If the 'min_val' & 'max_val' are specified to a specific precision, they may be overridden by the system, plotting a maximum 'max_y_ticks' ticks.

'include_zero' If 'true', forces the y-axis to include zero if it is not in the dataset range. Default is 'false'.

In general, it is better to use this, than to set the 'min_val' if that is all you want to achieve.

'skip_x_ticks' Sets the number of x-ticks and x-tick labels to skip. (i.e. if 'skip_x_ticks' was set to 4, Chart would draw every 4th x-tick and x-tick label). Default is undefined.

'custom_x_ticks' This option allows you to specify exactly which x-ticks and x-tick labels should be drawn. It should be assigned a reference to an array of desired ticks. Just remember that I'm counting from the 0th element of the array. (e.g., if 'custom_x_ticks' is assigned [0,3,4], then the 0th, 3rd, and 4th x-ticks will be displayed) It doesn't work for SPLIT, HORIZONTALBARS and PIE.

'f_x_tick' Needs a reference to a function which uses the x-tick labels generated by the `@data->[0]` as the argument. The result of this function reformats the labels as a string. For instance

```
$obj->set('f_x_tick'=>\&formatter;
```

An example for the function formatter: x labels are seconds since an event.

The `rf_rnc` function can transform this seconds to hour, minutes and seconds.

'f_y_tick' The same situation as for `'f_x_tick'` but now used for y labels.

'colors' This option lets you control the colors the chart will use. It takes a reference to a hash. The hash should contain keys mapped to references to arrays of rgb values. For instance,

```
$obj->set('colors' => 'background' => [255,255,255]);
```

sets the background color to white (which is the default). Valid keys for this hash are

- `'background'` (background color for the png)
- `'title'` (color of the title)
- `'text'` (all the text in the chart)
- `'x_label'` (color of the x axis label)
- `'y_label'` (color of the first y axis label)
- `'y_label2'` (color of the second y axis label)
- `'grid_lines'` (color of the grid lines)
- `'x_grid_lines'` (color of the x grid lines - for x axis ticks)
- `'y_grid_lines'` (color of the y grid lines - for left y axis ticks)
- `'y2_grid_lines'` (color of the y2 grid lines - for right y axis ticks)
- `'datas t0'..'datas t63'` (the different datasets)
- `'misc'` (everything else, e.g. ticks, box around the legend)

NB. For composite charts, there is a limit of 8 datasets per component. The colors for `'datas t8'` through `'datas t15'` become the colors for `'datas t0'` through `'datas t7'` for the second component chart.

'title_font' This option changes the font of the title. The key has to be a Gd font, e.g. `GD::Font->Large`.

'label_font' This option changes the font of the labels. The key has to be a Gd font.

'legend_font' This option changes the font of the text of the legend. The key has to be a Gd font.

'tick_label_font' This option changes the font of the ticks. The key has to be a Gd font.

'grey_background' Puts a nice soft grey background on the actual data plot when set to `'true'`. Default is `'true'`.

'x_grid_lines' Draws grid lines matching up to x ticks if set to `'true'`. Default is `'false'`.

'y_grid_lines' Draws grid lines matching up to y ticks if set to 'tru '. Default is 'fals '.

'grid_lines' Draws grid lines matching up to x and y ticks if set to 'tru '. Default is 'fals '.

'imagemap' Lets Chart know you're going to ask for information about the placement of the data for use in creating an image map from the png. This information can be retrieved using the `imagemap_dump()` method. NB. that the `imagemap_dump()` method cannot be called until after the Chart has been generated (e.g. using the `png()` or `cgi_png()` methods).

'ylabel2' The label for the right y-axis (the second component chart). Default is `undef`.

'no_cache' Adds Pragma: no-cache to the http header. Be careful with this one, as Netscape 4.5 is unfriendly with POST using this method.

'legend_example_size' Sets the length of the example line in the legend. Default is 20.

3 Chart::Bars

Name: Chart::Bars

File: Bars.pm

Requires: Chart::Base, GD, Carp, File::Handle

Description: BARS is a subclass of the module Chart::Base. The class BARS creates a chart with bars.

Example:

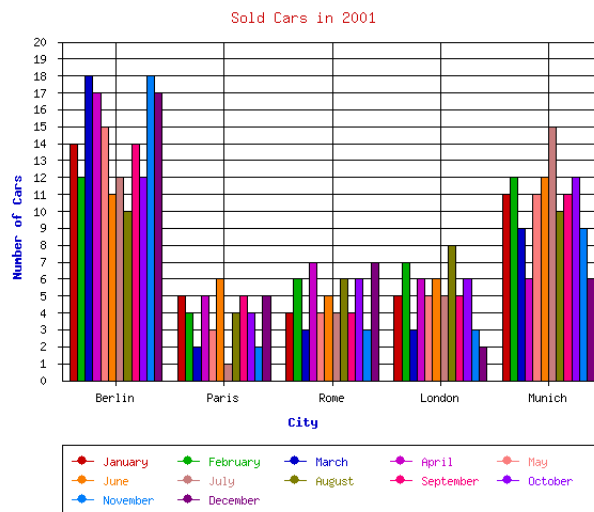


Figure 3: Bars chart

```
use Chart::Bars;

$g = Chart::Bars->new(600,500);

$g->dd_data set ('Berlin', 'Paris', 'Rome', 'London', 'Munich');
$g->dd_data set (14, 5, 4, 5, 11);
$g->dd_data set (12, 4, 6, 7, 12);
$g->dd_data set (18, 2, 3, 3, 9);
$g->dd_data set (17, 5, 7, 6, 6);
$g->dd_data set (15, 3, 4, 5, 11);
$g->dd_data set (11, 6, 5, 6, 12);
$g->dd_data set (12, 1, 4, 5, 15);
$g->dd_data set (10, 4, 6, 8, 10);
$g->dd_data set (14, 5, 4, 5, 11);
$g->dd_data set (12, 4, 6, 6, 12);
$g->dd_data set (18, 2, 3, 3, 9);
$g->dd_data set (17, 5, 7, 2, 6);
```

```
%h sh = ('title' => 'Sold C rs in 2001',
          'text_sp ce' => 5,
          'grey_b ckground' => 'f lse',
          'integer_ticks_only' => 'true',
          'x_l bel' => 'City',
          'y_l bel' => 'Number of C rs',
          'legend' => 'bottom',
          'legend_l bels' => ['J nu ry' , 'Febru ry' , 'M rch', 'April',
                              'M y', 'June', 'July', 'August', 'September',
                              'October', 'November', 'December'],
          'min_v l' => 0,
          'm x_v l' => 20,
          'grid_lines' => 'true',
          'colors' => {'title' => 'red',
                       'x_l bel' => 'blue',
                       'y_l bel' => 'blue'} );

$g->set (%h sh);

$g->png ("b rs.png");
```

Constructor: An instance of a bars chart object can be created with the constructor `new()`:

```
$obj = Chart::Bars->new();
$obj = Chart::Bars->new( width , height );
```

If `new()` has no arguments, the constructor returns an image with the size 300x400 pixels. If `new` has two arguments *width* and *height*, it returns an image with the desired size.

Methods:

All universally valid methods, see page 5 of class **CHART::BASE**.

Attributes/Options:

All universal valid options, see page 7.

In addition, the following options for this class are defined:

'y_axes' Tells chart where to place the y-axis. Valid values are 'left', 'right' and 'both'. Defaults to 'left'.

'spaced_bars' Allows space between the groups of bars at each data point when set to 'true'. This just makes it easier to read a bar chart. Defaults to 'true'.

4 Chart::Composite

Name: Chart::Composite

File: Composite.pm

Requires: Chart::Base, GD, Carp, File::Handle

Description: COMPOSITE is a subclass of CHART::BASE.

The class COMPOSITE creates a two component chart with two types of charts which are layed on above each other. Therefore, two similar chart types may have a conflict in the printout. For example, you can create a two component chart with bars and lines. Just set the option 'composite_info'! A composite chart doesn't make sense with all types of chart. But it works pretty good with Lines, Points, LinesPoints and Bars.

Example:

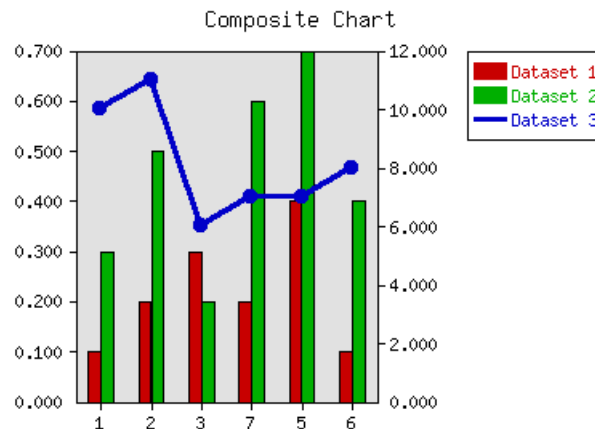


Figure 4: Composite chart

```
use Chart::Composite;

$g = Chart::Composite->new;

$g->dd_data set (1, 2, 3, 4, 5, 6);
$g->dd_data set (0.1, 0.2, 0.3, 0.2, 0.4, 0.1);
$g->dd_data set (0.3, 0.5, 0.2, 0.6, 0.7, 0.4);
$g->dd_data set (10, 11, 6, 7, 7, 8);

$g->set('title' => 'Composite Chart',
      'composite_info' => [ ['Bars', [1,2]],
                           ['LinesPoints', [3]] ]);

$g->set('include_zero' => 'true');
```

```
$g->png("composite.png");
```

Constructor: An instance of a Composite object can be created with the constructor `new()`:

```
$obj = Chart::Composite->new();  
$obj = Chart::Composite->new(width, height);
```

If `new()` has no arguments, the constructor returns an image with the size 300x400 pixels. If `new()` has two arguments *width* and *height*, it returns an image of the desired size.

Methods:

All universally valid methods, see page 5: `Chart::Base`.

Attributes/Options:

All universal valid options, see page 7.

The following options are also available:

'composite_info' This option is only used for composite charts. It contains the information about which types to use for the two component charts, and which datasets belong to which component chart. It should be a reference to an array of array references, containing information like the following

```
$obj->set('composite_info' => [ ['Bars', [1,2]], ['Lines', [3,4]] ] );
```

This example would set the two component charts to be a bar chart and a line chart. It would use the first two datasets for the bar chart (not that the numbering starts at 1, not zero like most of the other numbering things in Chart), and the second two datasets for the line chart. The default is undefined.

NB. `Chart::Composite` can only do two component charts.

'min_val1', 'min_val2' Only for composite charts, these options specify the minimum y-value for the first and second components respectively. Both default to undefined.

'max_val1', 'max_val2' Only for composite charts, these options specify the maximum y-value for the first and second components respectively. Both default to undefined.

'y_ticks1', 'y_ticks2' The number of y ticks to use on the first and second y-axis on a composite chart. Please note that if you just set the 'y_ticks' option, both axes will use that number of y ticks. Both default to undefined.

'brush_size1', 'brush_size2' If using composite charts having 'brush_size' as their attribute you can define the size of the brush individually. Default is 6.

'f_y_tick1', 'f_y_tick2' Needs a reference to a function which uses the y-tick labels for the first and second y-axis. The result of this function is formatted the labels as a string. For instance

```
$obj -> set('f_y_tick1') => \&format r1 ;
$obj -> set('f_y_tick2') => \&format r2 ;
```

'same_y_axes' Forces both component charts in a composite chart to use the same maximum and minimum y-values if set to 'true'. This helps to keep the composite charts from being too confusing. Default is undf.

'legend_example_height' Only for composite charts. This option changes the thickness of the lines in the legend. If 'legend_example_height' is set to 'true' the thickness of all 'legend-lines' can be changed. Default is false.

```
$obj -> set('legend_example_height' => 'true');
$obj -> set('legend_example_height0' => '3');
$obj -> set('legend_example_height1..4' => '10');
```

This example would set the thickness of the first line in the legend to 3, and the thickness of the following 4 lines to 10. The default values of the individual datasets (use the same order as in 'composite_info') are on , which means a 'normal' line is drawn. It is not possible to change a 'legend_example_height#'(# means a dataset number) which was once defined. The first value remains.

5 Chart::Direction

Name: Chart::Direction

File: Direction.pm

Requires: Chart::Base, GD, Carp, File::Handle

Description: DIRECTION is a **subclass** of Chart::Base.

This class Direction creates a diagram for polar coordinates.

Direction plots data, which is specified by angle (e.g. wind direction) and value (e.g. wind strength).

The first dataset to add is always a set of angles in degrees. The second set is a set of values. The right adding of following datasets depends on the option 'pairs'.

Direction will draw a point chart if no value is set to the option 'point'. You can also get a line chart by turning the option 'point' to 'false' and the option 'line' to 'true'. If you want a line point chart, then 'point' and 'line' has to be 'true'. Additionally chart plots arrows from the center to the point or to the end of the line, if the option 'arrow' is set to 'true'.

Example:

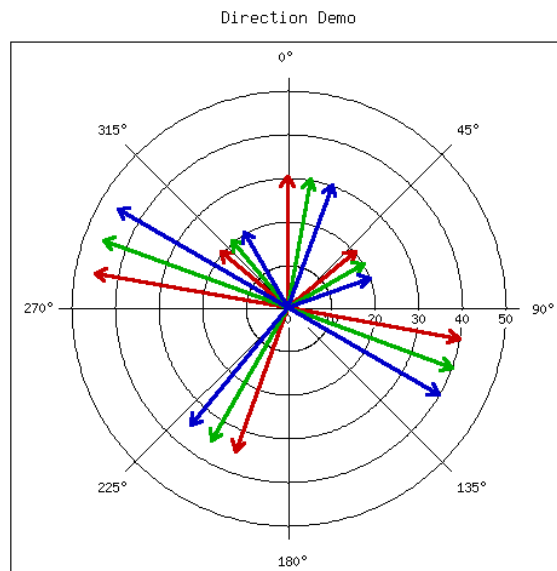


Figure 5: Direction chart

```
use Chart::Direction;  
$g = Chart::Direction->new(500,500);  
  
$g->dd_data_set( 0, 100, 50, 200, 280, 310);
```

```

$g-> dd_d t set(30, 40, 20, 35, 45, 20);

$g-> dd_d t set(10, 110, 60, 210, 290, 320);
$g-> dd_d t set(30, 40, 20, 35, 45, 20);

$g-> dd_d t set(20, 120, 70, 220, 300, 330);
$g-> dd_d t set(30, 40, 20, 35, 45, 20);

%h sh = ( 'title' => 'Direction Demo',
          'ngle_interv l' => 45,
          'precision' => 0,
          'rrow' => 'true',
          'point' => 'false',
          'include_zero' => 'true',
          'pairs' => 'true',
          'legend' => 'none',
          'grey_b ckground' => 'false');

$g->set(%h sh);
$g->png("Gr fiken/vector.png");

```

Constructor: An instance of a direction chart object can be created with the constructor `new()`:

```

$obj = Chart::Direction->new();
$obj = Chart::Direction->new(width, height);

```

If `new()` has no arguments, the constructor returns an image with the size 300x400 pixels. If `new` has two arguments *width* and *height*, it returns an image with the desired size.

Methods:

All universally valid methods, see page 5: `Chart::Base`.

Attributes/Options:

All universally valid options, see page 7. Additionally, you can have effects on the axes, like `'custom_x_ticks'`, `'x_ticks'` and so on. Also available, the special options:

'point' Indicates to draw points, representing the data values. `'true'` or `'false'` possible, per default `'true'`.

'line' Connects the points with lines if set to `'true'`. Defaults to `'false'`.

'arrow' Draws an arrow from the center of the chart to the point, if set to `'true'`, per default `'false'`.

'pairs' This option tells Chart how to handle more datasets. If `'pairs'` is set to `'true'`, Chart uses the first dataset as a set of degrees and the second dataset as a set of values. Then, the third set is a set of degrees and the fourth a set of values....

If 'pairs' is set to 'false', Chart uses the first dataset as a set of angles and all following datasets as sets of values.

Default is 'false'.

'angle_interval' This option tells Chart, how many angle lines should be drawn. It is the difference between two angle lines. The default value is 30, which means that a line will be drawn every 30 degrees. There are not all values allowed. Valid Values are : 0, 5, 10, 15, 20, 30, 45 and 90. If you choose 0, Chart will draw no lines.

'pt_size' Sets the radius of the points in pixels. Default is 18.

'brush_size' Sets the width of the lines in pixels. Default is 6.

'min_circles' Sets the minimum number of circles to draw when generating a scale. Default is 4, the minimum is 2.

'max_circles' Sets the maximum number of circles to draw when generating a scale. Default is 100. This limit is used to avoid plotting an unreasonable large number of ticks if non-round values are used for the min_val and max_val.

The value for 'max_circles' should be at least 5 times larger than 'min_circles'.

6 Chart::ErrorBars

Name: Chart::ErrorBars

File: ErrorBars.pm

Requires: Chart::Bas , GD, Carp, Fil Handl

Description:

```

#the y values
$g-> dd_d t set(qw(1 1.1 1.2 1.1 1.14 1.15 1.26 1.2 1.1 1.19 1.2
1.4 1.6 2.0 2.5 3.1));

#the up errors
$g-> dd_d t set(qw(0.4 0.1 0.2 0.1 0.14 0.15 0.26 0.27 0.1 0.19 0.2
0.1 0.1 0.2 0.1 0.3));

#the down errors
$g-> dd_d t set(qw(0.2 0.11 0.12 0.11 0.2 0.3 0.12 0.27 0.11 0.3 0.2
0.2 0.2 0.1 0.1 0.2));

$g->set( 'xy_plot' => 'true',
        'precision' => 1,
        'pt_size' => 10, 'brush_size' => 2,
        'legend' => 'none',
        'title' => 'Error Bars Demo',
        'grid_lines' => 'true');

$g->png("errorbars.png");

```

Constructor: An instance of a error bars chart object can be created with the constructor `new()`:

```

$obj = Chart::ErrorBars->new();
$obj = Chart::ErrorBars->new(width, height);

```

If `new()` has no arguments, the constructor returns an image with the size 300x400 pixels. If `new()` has two arguments *width* and *height*, it returns an image with the desired size.

Methods:

All universal valid methods, see page 5: **CHART::BASE**.

Attributes/Options:

All universally valid options, see page 7. Also available the special options:

'same_error' Tells chart that you want to use the same error value of a data point if set to true. Then you have to add just one set of error values. Defaults to 'false'.

'y_axes' Tells chart where to place the y-axis. Valid values are 'left', 'right' and 'both'. Defaults to 'left'.

'pt_size' Sets the radius of the points in pixels. Default is 18.

'brush_size' Sets the width of the lines in pixels. Default is 6.

'xy_plot' Forces Chart to plot a x-y-graph, which means that the x-axis is also numeric if set to 'true'. Very useful for plots of mathematical functions. Defaults to 'false'.

'sort' Sorts the data of a x-y-graph ascending if set to 'true '. Should be set if the added data isn't sorted. Defaults to 'false '.

7 Chart::HorizontalBars

Name: Chart::HorizontalBars

File: HorizontalBars.pm

Requires: Chart::Base, GD, Carp, File::Handle

Description: HORIZONTALBARS is a subclass of Chart::Base.

The class HORIZONTALBARS creates a chart with bars, that run horizontal.

Example:

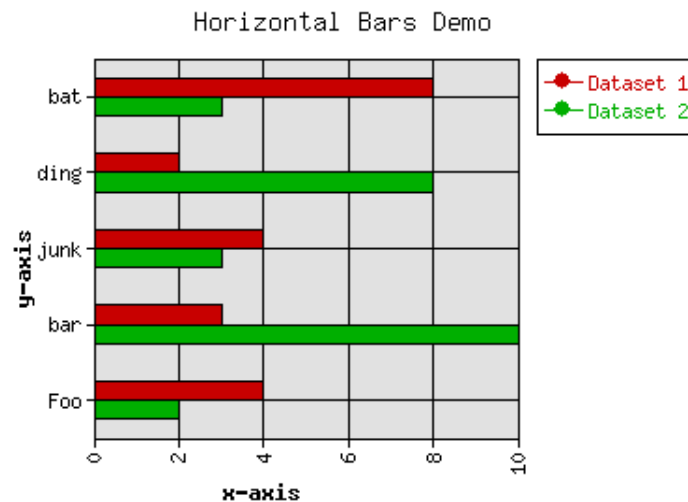


Figure 7: Chart with horizontal bars

```
use Chart::HorizontalBars;

$g = Chart::HorizontalBars->new();
$g->dd_data_set('Foo', 'bar', 'junk', 'ding', 'bat');
$g->dd_data_set(4, 3, 4, 2, 8);
$g->dd_data_set(2, 10, 3, 8, 3);

%hsh = ( 'title' => 'Horizontal Bars Demo',
          'grid_lines' => 'true',
          'xlabel' => 'x-axis',
          'ylabel' => 'y-axis',
          'include_zero' => 'true',
          'x_ticks' => 'vertical',
        );
$g->set(%hsh);
```



```
$g->png ("hb rs.png");
```

Constructor: An instance of a HorizontalBars object can be created with the constructor `new()`:

```
$obj = Chart::HorizontalBars->new();  
$obj = Chart::HorizontalBars->new(width, height);
```

If `new()` has no arguments, the constructor returns an image with the size 300x400 pixels. If `new()` has two arguments *width* and *height*, it returns an image with the desired size.

Methods:

All universal valid methods, see page 5: **Chart::Base**.

Attributes/Options:

All universally valid options, see page 7. Also available, the special options:

'y_axes' Tells chart where to place the y-axis. Valid values are 'left', 'right' and 'both'. Defaults to 'left'.

'spaced_bars' Allows spacing between the groups of bars at each data point when set to 'true'. This just makes it easier to read a bar chart. Defaults to 'true'.

'skip_y_ticks' Does the same for the y-axis at a HorizontalBars chart as 'skip_x_ticks' does for other charts. Defaults to 1.

8 Chart::Lines

Name: Chart::Lines

File: Lines.pm

Requires: Chart::Base, GD, Carp, File::Handle

Description: LINES is a subclass of Chart::Base.
The class Lines creates a lines chart.

Example:

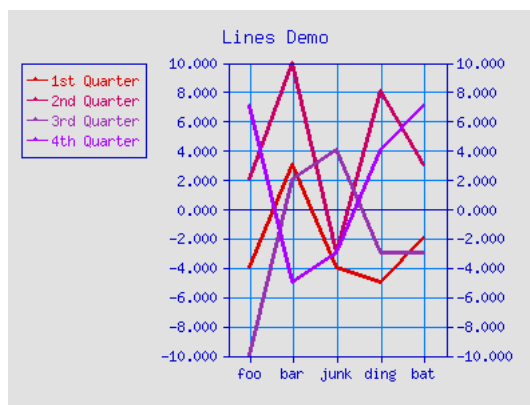


Figure 8: Lines chart

```
use Chart::Lines;

$g = Chart::Lines->new();
$g->dd_data_set('foo', 'bar', 'junk', 'ding', 'bat');
$g->dd_data_set(-4, 3, -4, -5, -2);
$g->dd_data_set(2, 10, -3, 8, 3);
$g->dd_data_set(-10, 2, 4, -3, -3);
$g->dd_data_set(7, -5, -3, 4, 7);

%hash = ('legend_labels' => ['1st Quarter', '2nd Quarter',
                              '3rd Quarter', '4th Quarter'],
         'y_axes' => 'both',
         'title' => 'Lines Demo',
         'grid_lines' => 'true',
         'legend' => 'left',
         'legend_example_size' => 20,
         'colors' => {'text' => 'blue',
                      'misc' => 'blue',
                      'background' => 'grey',
                      'grid_lines' => 'light_blue',
                      'data_set0' => [220,0,0],
```

```

        'd t set1' => [200,0,100],
        'd t set2' => [150,50,175],
        'd t set3' => [170,0,255] },
    );

$g->set (%h sh);

$g->png ("lines.png");

```

Constructor: An instance of a lines chart object can be created with the constructor *new()*:

```

$obj = Chart::Lines->new();
$obj = Chart::Lines->new(width, height);

```

If *new()* has no arguments, the constructor returns an image with the size 300x400 pixels. If now has two arguments *width* and *height*, it returns an image with the desired size.

Methods:

All universal valid methods, see page 5 of **CHART::BASE**.

Attributes/Options:

All universal valid options, see page 7. Special options for this type of chart are:

'y_ axes' Tells chart where to place the y-axis. Valid values are 'left', 'right' and 'both'. Defaults to 'left'.

'brush_ size' Sets the width of the lines in pixels. Default is 6.

'xy_ plot' Forces Chart to plot a x-y-graph, which means that the x-axis is also numeric if set to 'true'. Very useful for plots of mathematical functions. Defaults to 'false'.

'sort' Sorts the data of a x-y-graph ascending if set to 'true'. Should be set if the added data isn't sorted. Defaults to 'false'.

'stepline' The points are connected by a stepping function, instead by a direct line if set to 'true'. Defaults to 'false'.

'stepline_ mode' Determines whether to start with the first point (if set to 'begin') or end with the last point if set to 'end'. Defaults to 'begin'.

9 Chart::LinesPoints

Name: Chart::LinesPoints

File: LinesPoints.pm

Requires: Chart::Base, GD, Carp, File::Handle

Description: LINESPOINTS is a subclass of CHART::BASE. The class LINESPOINTS creates a line chart with points marking the individual coordinates of the data.

Example:

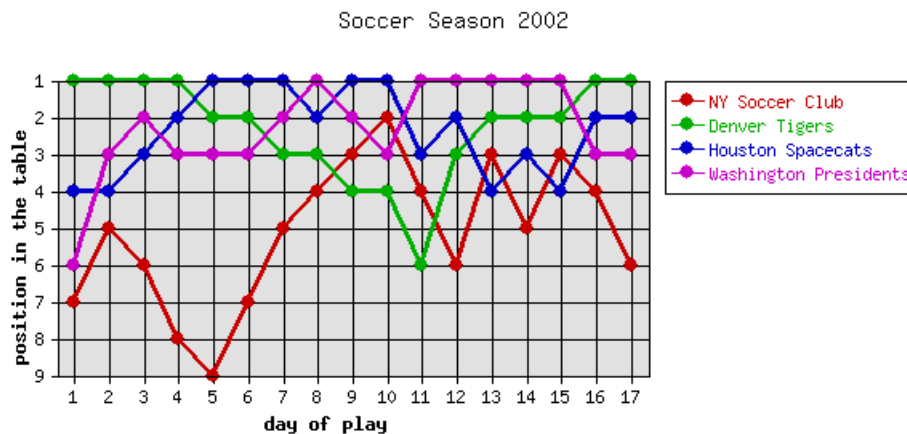


Figure 9: Lin spoints chart

```
use Chart::LinesPoints;
use strict;

my (@d t 1, @d t 2, @d t 4, @d t 3, @l bels, %h sh, $g);

@l bels = qw(1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17);
@d t 1 = qw (-7 -5 -6 -8 -9 -7 -5 -4 -3 -2 -4 -6 -3 -5 -3 -4 -6);
@d t 2 = qw (-1 -1 -1 -1 -2 -2 -3 -3 -4 -4 -6 -3 -2 -2 -2 -1 -1);
@d t 3 = qw (-4 -4 -3 -2 -1 -1 -1 -2 -1 -1 -3 -2 -4 -3 -4 -2 -2);
@d t 4 = qw (-6 -3 -2 -3 -3 -3 -2 -1 -2 -3 -1 -1 -1 -1 -1 -3 -3);

$g = Chart::LinesPoints->new(600,300);
$g-> dd_d t set(@l bels);
$g-> dd_d t set(@d t 1);
$g-> dd_d t set(@d t 2);
$g-> dd_d t set(@d t 3);
$g-> dd_d t set(@d t 4);
```

```
%h sh =(
    'integer_ticks_only' => 'true',
    'title' => 'Soccer Se son 2002\n ',
    'legend_labels' => ['NY Soccer Club', 'Denver Tigers',
                        'Houston Sp cec ts', 'W shington Presidents'],
    'y_label' => 'position in the t ble',
    'x_label' => 'd y of pl y',
    'grid_lines' => 'true',
    'format_ytick' => \&format,
);

$g->set ( %h sh);
$g->png ("Gr fiken/d_linesp2.png");

#just a trick, to let the y scale start at the biggest point:
#initialize with negative values, remove the minus sign!
sub format {
    my $label = shift;
    $label = substr($label, 1,2);
    return $label;
}
```

Constructor: An instance of a line points chart object can be created with the constructor *new()*:

```
$obj = Chart::LinesPoints->new();
$obj = Chart::LinesPoints->new(width, height);
```

If *new()* has no arguments, the constructor returns an image with the size 300x400 pixels. If *new()* has two arguments *width* and *height*, it returns an image with the desired size.

Methods:

All universal valid methods, see page 5 of **CHART::BASE**.

Attributes/Options:

All universal valid options, see page 7. Also available the special options:

'y_ axes' Tells chart where to place the y-axis. Valid values are 'left', 'right' and 'both'. Default faults to 'left'.

'pt_ size' Sets the radius of the points in pixels. Default is 18.

'brush_ size' Sets the width of the lines in pixels. Default is 6.

'xy_ plot' Forces Chart to plot a x-y-graph, which means that the x-axis is also numeric if set to 'true'. Very useful for plots of mathematical functions. Default faults to 'false'.

- 'sort'** Sorts the data of a x-y-graph ascending if set to 'true'. Should be set if the added data isn't sorted. Defaults to 'false'.
- 'stepline'** The points are connected by a stepping function, instead by a direct line if set to 'true'. Defaults to 'false'.
- 'stepline_mode'** Determines whether to start with the first point (if set to 'begin') or end with the last point if set to 'end'. Defaults to 'begin'.

10 Chart::Mountain

Name: Chart::Mountain

File: Mountain.pm

Requires: Chart::Bas , GD, Carp, File::Handle

Description: MOUNTAIN is a subclass of Chart::Bas . The class Mountain creates a mountain chart.

Example:

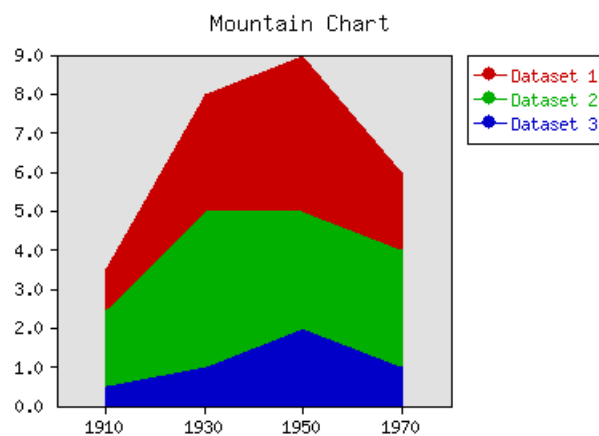


Figure 10: Mountain chart

```
use Chart::Mountain;

$g = Chart::Mountain->new();

@data = [ [1910, 1930, 1950, 1970],
          [1, 3, 4, 2],
          [2, 4, 3, 3],
          [0.5, 1, 2, 1] ];

$g->set('title' => 'Mountain Chart',
       'grid_lines' => 'false',
       'precision' => 1);

$g->png("mountain.png", @data );
```

Constructor: An instance of a mountain chart object can be created with the constructor *new()*:

```
$obj = Chart::Mountain->new();  
$obj = Chart::Mountain->new( width , height );
```

If *new()* has no arguments, the constructor returns an image with the size 300x400 pixels. If *new()* has two arguments *width* and *height*, it returns an image with the desired size.

Methods:

All universal valid methods, see page 5 of **CHART::BASE**.

Attributes/Options:

All universal valid options, see page 7. Also available, the special options:

'y_axes' Tells chart where to place the y-axis. Valid values are 'left', 'right' and 'both'. Defaults to 'left'.

11 Chart::Pareto

Name: Chart::Par to

File: Par to.pm

Requires: Chart::Bas , GD, Carp, Fil Handl

Description: PARETO is a subclass of class C ART::BASE. Th class PARETO cr at s a par -to chart. Par to plots only on datas t and its lab ls.

Example:

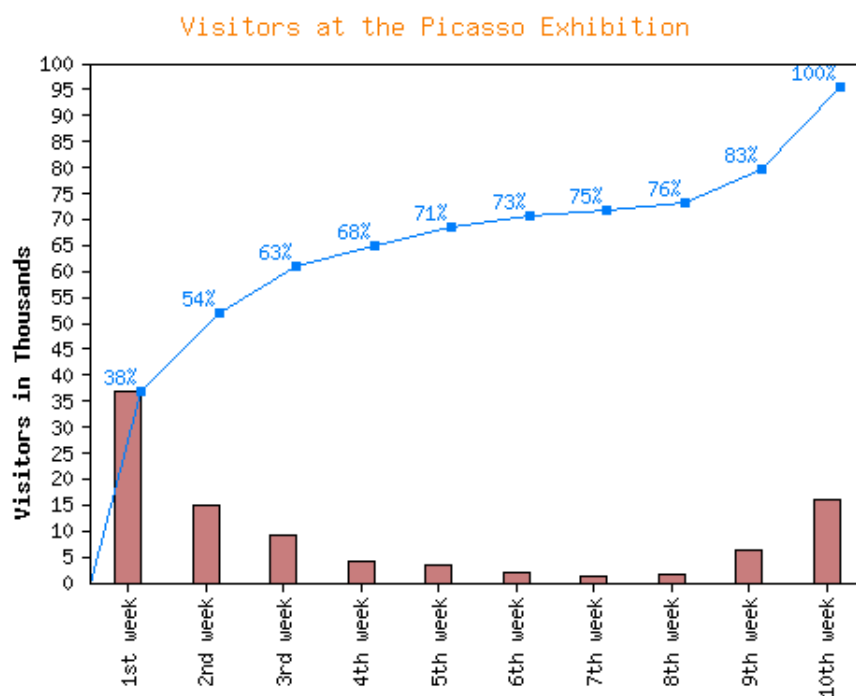


Figure 11: Par -to chart

```
use Chart::Pareto;

$g = Chart::Pareto->new(500,400);
$g->dd_data set ('1st week', '2nd week', '3rd week', '4th week', '5th week',
                '6th week', '7th week', '8th week', '9th week', '10th week');
$g->dd_data set (37, 15, 9, 4, 3.5,
                2.1, 1.2, 1.5, 6.2, 16);

%hash = ( 'colors' => { 'data set0' => 'm uve',
                        'data set1' => 'light_blue',
                        'title' => 'or nge'},
```

```

    'title' => 'Visitors t the Picasso Exhibition',
    'integer_ticks_only' => 'true',
    'skip_int_ticks' => 5,
    'grey_b ckground' => 'f lse',
    'm x_v l' => 100,
    'y_l bel' => 'Visitors in Thous nds',
    'x_ticks' => 'vertic l',
    'sp ced_b rs' => 'true',
    'legend' => 'none'
  );

```

```

$g->set (%h sh);
$g->png ("p reto.png");

```

Constructor: An instance of a par-to chart object can be created with the constructor `new()`:

```

$obj = Chart::Pareto->new();
$obj = Chart::Pareto->new( width , height );

```

If `new` has no arguments, the constructor returns an image with the size 300x400 pixels. If `new` has two arguments *width* and *height*, it returns an image with the desired size.

Methods: All universally valid methods, see page 5: `Chart::Base`.

Attributes/Options: All universally valid options, see page 7. Also available, the special options:

'y_axes' Tells chart where to place the y-axis. Valid values are 'left', 'right' and 'both'. Defaults to 'left'.

'spaced_bars' Allows space between bars at each data point when set to 'true'. This just makes it easier to read a bar chart. Default is 'true'.

'sort' Sorts the data descending if set to 'true'. Defaults to 'false'.

12 Chart::Pie

Name: Chart::Pi

File: Pi.pm

Requires: Chart::Base, GD, Carp, File::Handle

Description: PIE is a subclass of class CHART::BASE. The class PIE creates a pie chart. The first added star the labels. The second star the values.

Example:

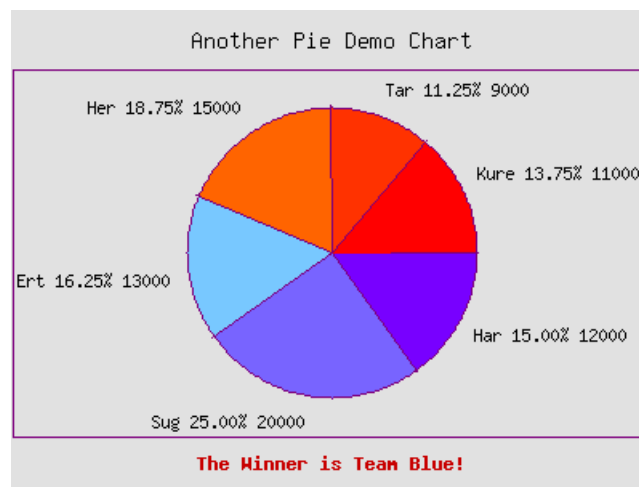


Figure 12: Pie chart

```
use Chart::Pie;

$g = Chart::Pie->new();

$g->dd_data_set('Har', 'Sug', 'Ert', 'Her', 'Tar', 'Kure');
$g->dd_data_set(12000, 20000, 13000, 15000, 9000, 11000);

%opt = ( 'title' => 'Another Pie Demo Chart',
          'label_values' => 'both',
          'legend' => 'none',
          'text_space' => 10,
          'png_border' => 1,
          'graph_border' => 0,
          'colors' => { 'x_label' => 'red',
                        'misc' => 'plum',
                        'background' => 'grey',
                        'data_set0' => [120, 0, 255],
                        'data_set1' => [120, 100, 255],
```

```

        'd t set2' => [120, 200, 255],
        'd t set3' => [255, 100, 0],
        'd t set4' => [255, 50, 0],
        'd t set5' => [255, 0, 0],
    },
    'x_l bel' => 'The Winner is Te m Blue!',
);

```

```
$g->set (%opt);
```

```
$g->png ("pie.png");
```

Constructor: An instance of a pie chart object can be created with the constructor *new()*:

```

$obj = Chart::Pie->new();
$obj = Chart::Pie->new(width, height);

```

If *new()* has no arguments, the constructor returns an image with the size 300x400 pixels. If *new()* has two arguments *width* and *height*, it returns an image within the desired size.

Methods:

All universal valid methods, see page 5 of class `CHART::BASE`.

Attributes/Options:

All universal valid options, see page 7. Also available, the special options:

'label_values' Tells the pie chart what labels to draw beside the pie. Valid values are 'percent', 'value', 'both' and 'none'. Default faults to 'percent'.

'legend_label_values' Tells the pie chart what labels to draw in the legend. Valid values are 'percent', 'value', 'both' and 'none'. Default faults to 'value'.

'legend_lines' The labels drawn beside the pie are connected with a line to the segment.

'ring' The pie has a ring structure.

13 Chart::Points

Name: Chart::Points

File: Points.pm

Requires: Chart::Bas , GD, Carp, Fil Handl

Description: POINTS is a subclass of class C ART::BASE.
The class Points creates a point chart.

Example:

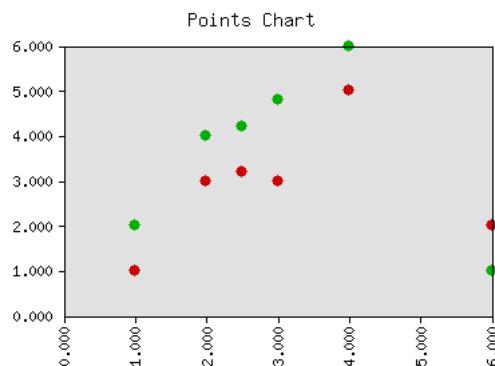


Figure 13: Points chart

```
use Chart::Points;

$g = Chart::Points->new();
$g->dd_data set (1, 4, 3, 6, 2, 2.5); # x-coordinates
$g->dd_data set (1, 5, 3, 2, 3, 3.2); # y-coordinates d t set 1
$g->dd_data set (2, 6, 4.8, 1, 4, 4.2); # y-coordinates d t set 2

@hsh = ('title' => 'Points Chart',
        'xy_plot' => 'true',
        'x_ticks' => 'vertical',
        'legend' => 'none',
        'sort' => 'true',
        'precision' => 3,
        'include_zero' => 'true',
);

$g->set (@hsh);

$g->png ("Graphics/points.png");
```

Constructor: An instance of a points chart object can be created with the constructor *new()*:

```
$obj = Chart::Points->new();  
$obj = Chart::Points->new(width, height);
```

If *new()* has no arguments, the constructor returns an image with the size 300x400 pixels. If *new* has two arguments *width* and *height*, it returns an image with the desired size.

Methods:

All universal valid methods, see page 5 of class CHART::BASE.

Attributes/Options:

All universal valid options, see page 7. Also available the special options:

'y_axes' Tells chart where to place the y-axis. Valid values are 'left', 'right' and 'both'. Default faults to 'left'.

'pt_size' Sets the radius of the points in pixels. Default is 18.

'sort' Sorts the data of a x-y-graph ascending if set to 'true'. Should be set if the added data isn't sorted. Default faults to 'false'.

'xy_plot' Forces Chart to plot a x-y-graph, which means that the x-axis is also numeric if set to 'true'. Very useful for plots of mathematical functions. Default faults to 'false'.

14 Chart::Split

Name: Chart::Split

File: Split.pm

Requires: Chart::Base, GD, Carp, File::Handle

Description: SPLIT is a subclass of class Chart::Base.

The class SPLIT creates a line chart. Split makes always an xy-plot, which means that both axes are numeric. The x-axis will be split in several parts of a same interval (option 'interval' has to be set!). These intervals will be drawn on upon the other. The top interval starts at the start point, which has to be set by the programmer (option 'start'). The first passed data set are the x coordinates. The following added sets are the y coordinates of the sets.

Split draws only positive x-coordinates.

The y-axis is a numbering of the intervals.

The Split module is useful if you have a lot of data points to plot. An example is to plot weather or seismic data.

Example:

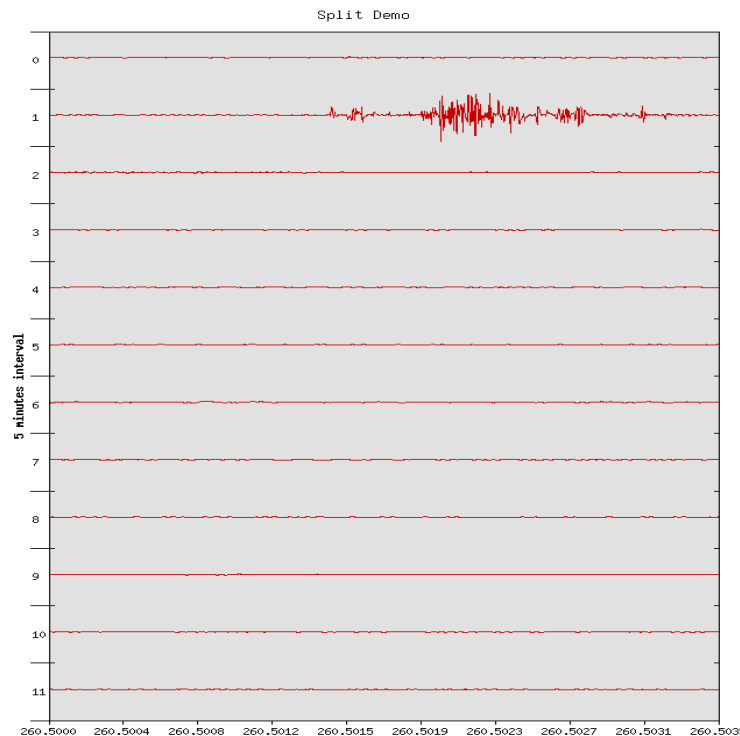


Figure 14: Split chart

```
use Chart::Split;
```

```

$g = Chart::Split->new(650 ,900);

#get the d t t h t re in file nd push them in r r y s
open( FILE , "d t .d t") or die 'C n't open the d t file!\n';
while (defined ($line = <FILE>)) {
    ($x, $y,) = unpk(" 11 x1 8" , $line);
    push (@y, $y);
    push (@x, $x);
}
close (FILE);

# dd the d t
$g-> dd_d t set(@x);
$g-> dd_d t set(@y);

#set the options
$g->set('xy_plot' => 'true');
$g->set('legend' => 'none');
$g->set('title' => 'Split Demo');
$g->set('interv l' => 1/288);
$g->set('interv l_ticks' => 10);
$g->set('st rt' => 260.5);
$g->set('brush_size' => 1);
$g->set('precision' => 4);
$g->set('y_l bel' => '5 minutes interv l');

#give me nice picture
$g->png("split.png");

```

Constructor: An instance of a split chart object can be created with the constructor *new()*:

```

$obj = Chart::Split->new();
$obj = Chart::Split->new(width, height);

```

If *new()* has no arguments, the constructor returns an image with the size 300x400 pixels. If *new* has two arguments *width* and *height*, it returns an image with the desired size.

Methods:

All universal valid methods, see page 5 of class `Chart::Base`.

Attributes/Options:

All universal valid options, see page 7. Also available, the special options:

'start' *Required* value for a split chart.

If the x coordinate of the first data point is zero, you should set start to zero. Sets the start value of the first interval. Defaults to undefined.

'interval' *Required* value of a split chart.

Sets the interval of on-line to plot. Defaults to `undefined`.

'interval_ticks' Sets the number of ticks for the x-axis. Defaults to 5.

'scale' Every y-value of a split chart will be multiplied by that value, but the scale won't be changed. This means you may overdraw certain rows! Only useful if you want to give prominence to the maximal amplitudes of the data. Defaults to 1.

'sort' Sorts the data ascending if set to `'true'`. Should be set if the added data isn't sorted. Defaults to `'false'`.

'y_axes' Tells chart where to place the y-axis. Valid values are `'left'`, `'right'` and `'both'`. Defaults to `'left'`.

15 Chart::StackedBars

Name: Chart::Stack dBars

File: Stack dBars.pm

Requires: Chart::Bas , GD, Carp, Fil Handl

Description: STACKEDBARS is a **subclass** of class C ART::BASE. Th class Stack dBars cr at s a chart with stack d bars.

Example:

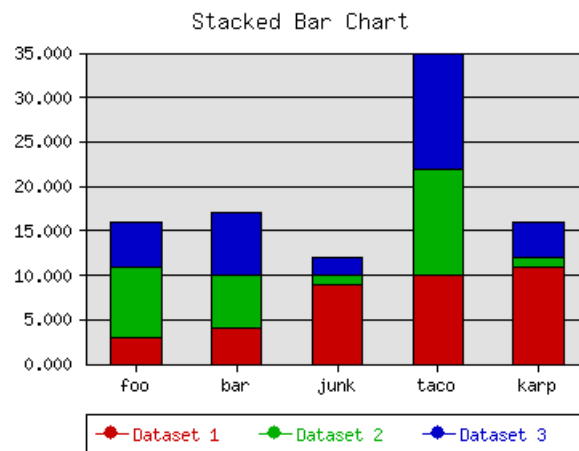


Figure 15: Chart with stack d bars

```
use Chart::StackedBars;

$g = Chart::StackedBars->new;

$g->dd_data set ('foo', 'bar', 'junk', 'taco', 'karp');
$g->dd_data set (3, 4, 9, 10, 11);
$g->dd_data set (8, 6, 1, 12, 1);
$g->dd_data set (5, 7, 2, 13, 4);

$g->set ('title' => 'Stacked Bar Chart');
$g->set('y_grid_lines' => 'true');
$g->set('legend' => 'bottom');

$g->png ("Graphics/stackedbars.png");
```

Constructor: An instance of a stacked bars object can be created with the constructor *new()*:

```
$obj = Chart::StackedBars->new();  
$obj = Chart::StackedBars->new(width, height);
```

If *new()* has no arguments, the constructor returns an image with the size 300x400 pixels. If *new()* has two arguments *width* and *height*, it returns an image with the desired size.

Methods:

All universal valid methods, see page 5 of class CHART::BASE.

Attributes/Options:

All universal valid options, see page 7. Also available, the special options:

'y_axes' Tells chart where to place the y-axis. Valid values are 'left', 'right' and 'both'. Default is 'left'.

'spaced_bars' Allows space between the groups of bars at each data point when set to 'true'. This just makes it easier to read a bar chart. Default is 'true'.

List of Figures

1	Th hi rarchy of chart	3
2	El m nts of a chart	3
3	Bars chart	12
4	Composit chart	14
5	Dir ction chart	17
6	Error bars chart	20
7	Chart with horizontal bars	23
8	Lin s chart	25
9	Lin spoints chart	27
10	Mountain chart	30
11	Par -to chart	32
12	Pi chart	34
13	Points chart	36
14	Split chart	38
15	Chart with stack d bars	41

Index

`$obj->add_datafil` , 6
`$obj->add_datas` `tadd_ddatas` `t`, 5
`array`), 5
`$obj->cgi_jp` `g`, 7
`$obj->cgi_png`, 7
`$obj->cl_ar_data`, 6
`$obj->g_t_data`, 6
`$obj->imag_map_dump`, 7
`$obj->jp` `g`, 7
`$obj->png`, 6
`$obj->s` `t`, 6

`Bars`, 5
`Bas` , 5

`Chart::Bars`, 12
`Chart::Bas` , 5
`Chart::Composit` , 14
`Chart::Dir ction`, 17
`Chart::ErrorBars`, 20
`Chart::HorizontalBars`, 23
`Chart::Lin s`, 25
`Chart::Lin sPoints`, 27
`Chart::Mountain`, 30
`Chart::Par to`, 32
`Chart::Pi` , 34
`Chart::Points`, 36
`Chart::Split`, 38
`Chart::Stack dBars`, 41

`Class`

- `Bars`, 7, 12
- `Bas` , 5
- `Chart`, 3
- `Chart::Bas` , 13–15, 20, 21, 23, 25–28, 31, 32, 34–39, 41, 42
- `Composit` , 14
- `Dir ction`, 17
- `ErrorBars`, 20
- `HorizontalBars`, 7, 9, 23
- `Lin s`, 7, 25
- `Lin sPoints`, 7, 27
- `Mountain`, 30
- `Par to`, 7, 32
- `Pi` , 4, 9, 34
- `Points`, 7, 36
- `Split`, 7, 9, 38
- `Stack dBars`, 7, 41

`Composit` , 5

`Dir ction`, 5

`ErrorBars`, 5

`HorizontalBars`, 5

`Lincoln St in's GD modul` , 4
`Lin s`, 5
`Lin sPoints`, 5

`Mountain`, 5

`n w()`, 5

`Par to`, 5
`Pi` , 5
`Points`, 5

`Split`, 5
`Stack dBars`, 5