



*Tutorials and worked examples for simulation,
curve fitting, statistical analysis, and plotting.
<https://simfit.org.uk>*

Usually scientific graphs are in landscape, square, or portrait aspect ratios as they are intended for inclusion in documents. However there are many occasions where the data to be displayed are very extensive which would lead to overcrowding of curves or overlapping of labels and plotting symbols. Examples would be the display of dendrograms, forest plots, time series, or spectra where it would be useful to display data with extreme aspect ratios and attached scroll bars to scan the graph vertically or horizontally, as with chart-paper. Fortunately internet graphics using scalable vector graphics (SVG) allows this as all browsers support the SVG format, and SIMFIT provides facilities to stretch out overcrowded SVG graphs.

Unfortunately, where a graph is in bitmap, compressed bitmap, or vector format with landscape, square, or portrait aspect ratio, it is not possible to merely stretch the graph as this would lead to pixellation, and distortion of characters and plotting symbols, e.g., circles becoming ellipses, squares becoming rectangles, etc., so a special type of stretching procedure is required.

SIMFIT allows users to sculpture plots in advanced 2D format by editing symbols, line-types, labels, colors, titles and legends, but then to save in SVG format followed by interactively applying differential scaling until a satisfactory aspect ratio has been achieved before saving to a new SVG file which will automatically be displayed with scroll bars in browsers.

So differential scaling as defined in this way requires several steps in SIMFIT as follows.

1. Sculpture the graph in advanced 2D graphics
2. Choose the [SVG] option to view the current plot as SVG
3. Select values for X_scale and Y_scale and view the outcome
4. When satisfied save as a new differentially scaled SVG file

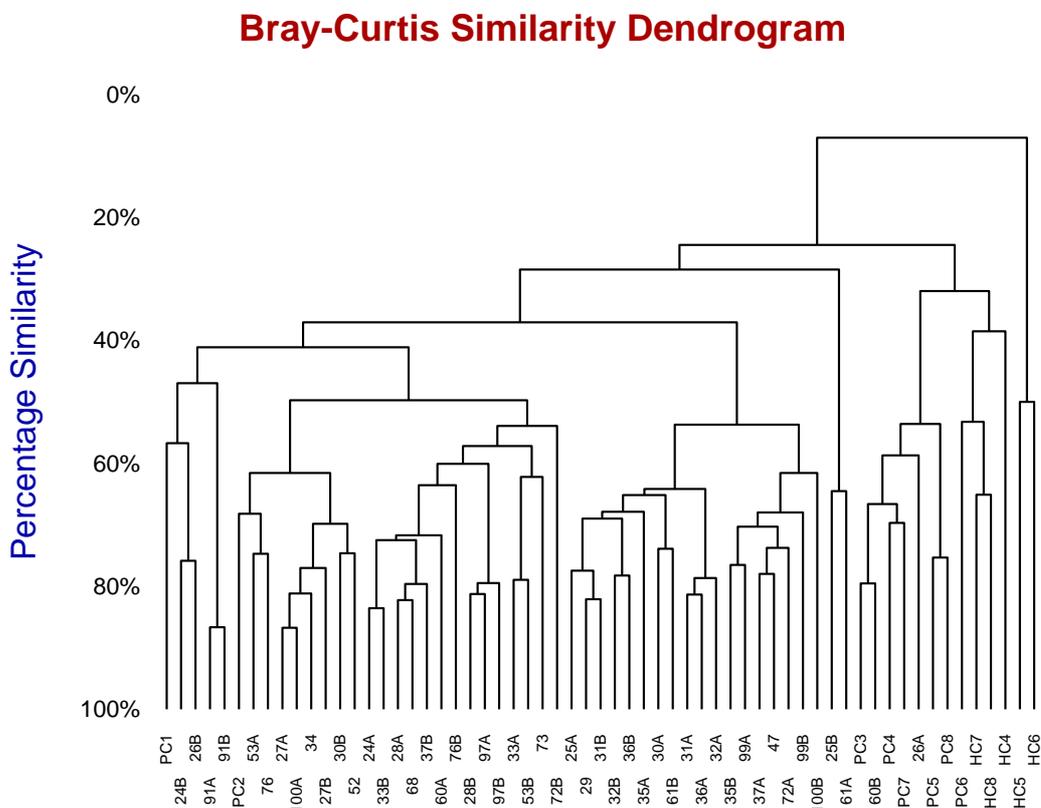
Note that the differentially scaled SVG files will have the following characteristics.

- The fonts and inter-character spacings will remain unchanged
- The line type and thickness will remain unchanged
- The plotting symbols will maintain their aspect ratios
- Only the white space between the lines, symbols and labels will change
- However there are likely to be unexpected effects if extreme scaling is used. For instance.
 - With horizontally stretched graphs a centralized title or X-legend may only become visible after horizontal scrolling.
 - With vertically stretched graphs a centralized Y-legend may only become visible after vertical scrolling.
 - In extreme cases like this it is best to delete the offending title or legend and add a new text string in an appropriate position, i.e., close to the top left of the plot.
 - Moving text, arrows, or information panels by eye with the red arrow will never be precise and this will become increasingly obvious as the scaling increases. Positioning can be improved by using the graticule function, i.e., the mesh of intersecting lines created from the [Style] button.

Some of the unexpected effects and avoidance of such issues will be clear by detailing several examples that will be discussed next and, to understand this material, it should be combined with viewing the page <https://simfit.org.uk/svg.html>.

A normal dendrogram

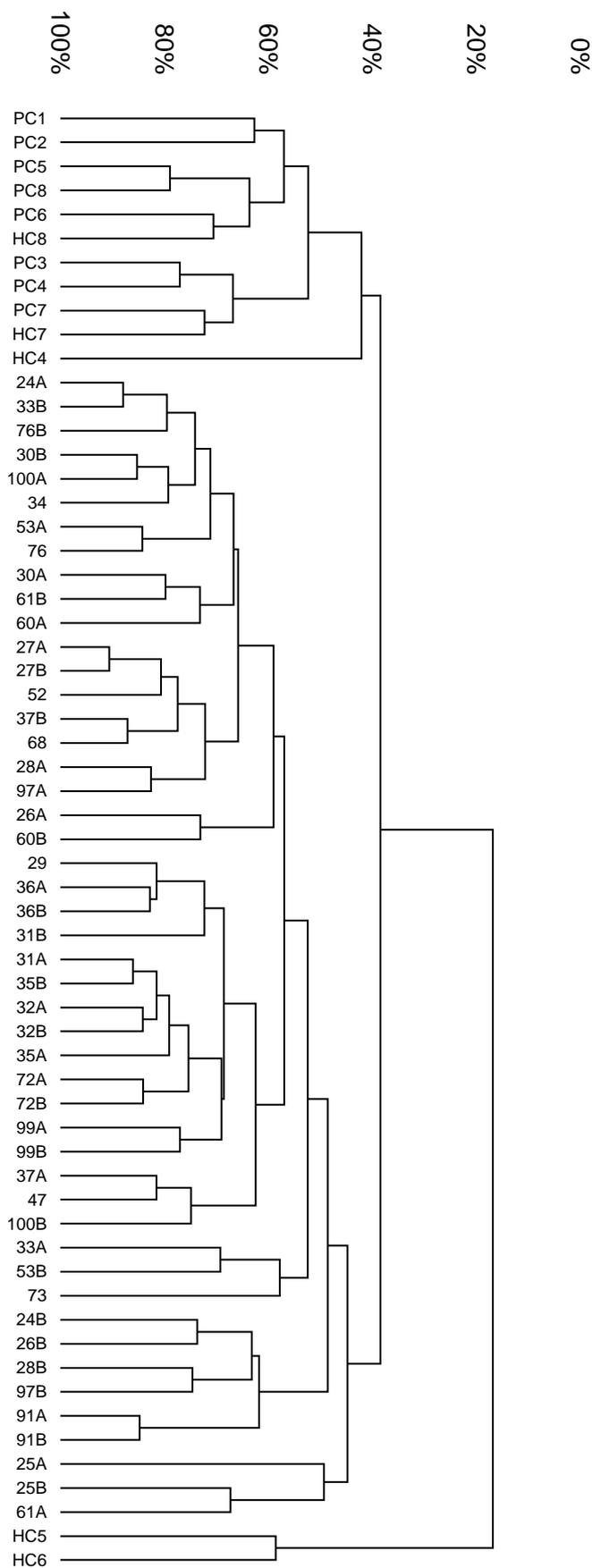
This is a very simple example where differential scaling is scarcely necessary but, as it does illustrate several points, creation of the next plot requires some explanation.



The steps required to generate this default plot are as follows.

1. The SIMFIT test data file `cluster.tf2` contains a multivariate data set that can be used to generate a dendrogram either by input into the SIMFIT program **simstat** then choosing multivariate statistics to create a distance matrix with a chosen metric followed by plotting a dendrogram with labels, or by input into **simplot** then opening the option to create statistical graphs.
2. The type of dendrogram required can be selected as the Bray-Curtis similarity type, which is often used for such biological data. This would, of course, always be a user-selected decision that would depend on the data and either statistical arguments or simply the visual appearance preferred.
3. The title and legend would normally be edited at this stage as required.
4. It should be noted that, with this example, SIMFIT has automatically chosen to create a double label system with rotated X axis labels in order to create a legible X-axis labeling system without the labels overlapping.

The next plot illustrates the effect of differential X-axis scaling, where the title and Y-legend have been suppressed in order to display the graph in as large a size as is possible in a document.



To generate this particular figure these steps were taken.

The dendrogram was created in SIMFIT advanced 2D graphics

The title was suppressed.

The Y–legend was suppressed.

The double label threshold was increased using the [Labels] option followed by choosing to edit the X-axis labels

This allows the labels to be displayed on one line.

The font size for the Y–axis numbers and the X–axis labels was increased.

To improve legibility the X-axis scaling factor X_scale was then increased to 3.

Of course the graph becomes too large to display in this document so the scrolling version with title and Y–legend has to be observed using the [SVG] option from the main page at

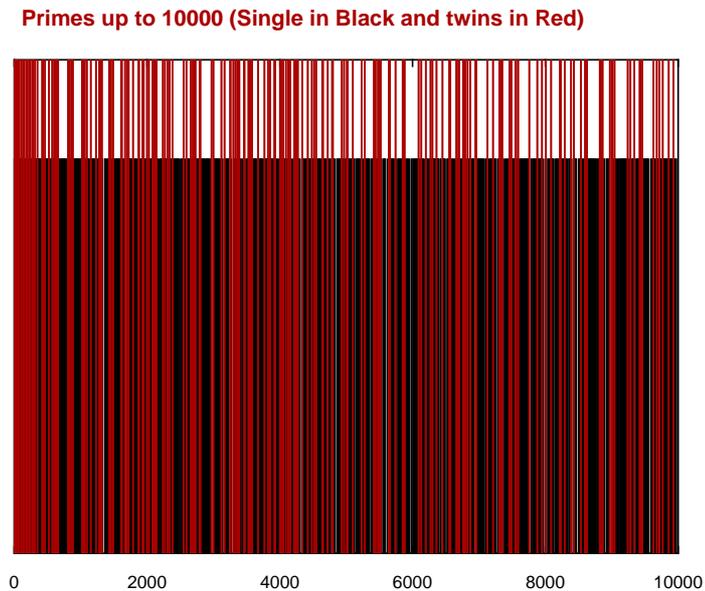
<https://simfit.org.uk>.

In order to view with the labels in standard orientation rather than rotated it would then be necessary to increase the X–scaling factor to a larger value than 3 so as to maintain legibility and prevent labels overlapping.

The re–scaled and edited graph was saved to a new file which is displayed to the left, after rotation.

An extremely crowded plot

To create the chart–paper type of plot for primes displayed on the website the test files `primes.tf1` and `primes.tf2` were input into `SIMFIT` program `simplot` followed by editing the Y -axis to have range $(0, 1.25)$, the data being plotted with no lines but with solid barchart–type symbols colored black for `primes.tf1` and red for `primes.tf2`, to create the next figure (after suppressing X and Y legends and Y labels and using integers as X -labels).



Using the `SIMFIT` Postscript facility described for the previous example to stretch by a factor of 10 and then clip out the start of this graph to an EPS file (shown below) indicates the effect of differential scaling to separate out the vertical bars from the solid mass of color in the plot (shown above) without differential scaling. This is seen more clearly in the scrolling example stretched by a factor of 20 on the website.

