The `pst-2dplot` Package

(version 1.5)

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1 Introduction

This document introduces the package `pst-2dplot` that is an easy-to-use and intuitive tool for drawing two-dimensional plots in LaTeX documents. The main environment introduced by `pst-2dplot` is `pstgraph` that draws grid lines, tag numbers, and labels on both axes. I have to mention that there are more features that I am planning to add. Nevertheless, I felt that the current version is still useful.

To use this package, add the following command to the preamble of your document.

`\usepackage{pst-2dplot}`

pstgraph   The syntax of the `pstgreaph` environment is as follows.

`\begin{pstgraph}[`*key=value*`](`x_0`,`y_0`)`
    $\vdots$
`\end{pstgraph}`

As depicted in Figure 1, the `pstgraph` environment draws a box of side lengths x_0 and y_0. The
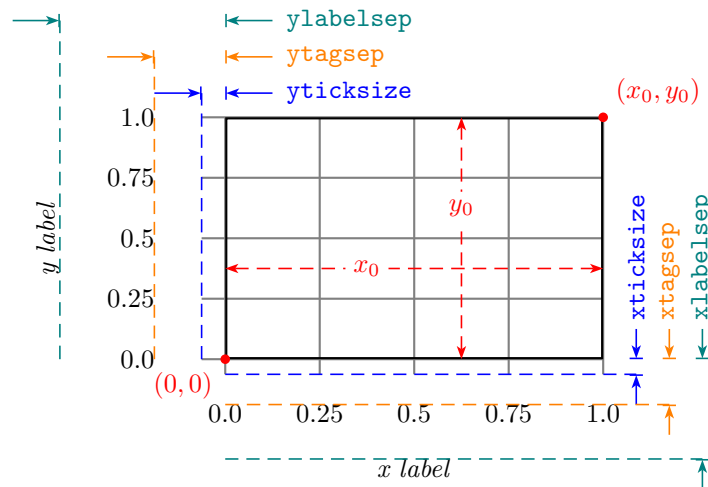

Figure 1. `pstgraph` environment

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coordinates of the lower left corner and upper right corner of the box are $(0,0)$ and (x_0, y_0), respectively. Keys of the `pstgraph` environment can be set either directly or through the `\setpstgraph` macro with the following syntax.

setpstgraph

$$\setpstgraph\{key_1{=}value_1, key_2{=}value_2, \ldots\}$$

This macro must be used outside the `pstgraph` environment for the keys to take effect. The keys defined by the `pstgraph` environment are summarized in Table 1.

pstlabel

The labels of the x and y axes can be set either directly or through the `\pstlabel` macro, which has the following syntax.

$$\pstlabel\{x\text{-}label\}\{y\text{-}label\}$$

This macro can be used either inside or outside the `pstgraph` environment.

pstfileplot

The last macro defined by the `pst-2dplot` is `\pstfileplot` that is used to draw the data in the file *data-file*. The syntax of this macro is as follows.

$$\pstfileplot[key{=}value]\{data\text{-}file\}$$

Assuming $(x_0, y_0), (x_1, y_1), (x_2, y_2), \ldots$ are the points on a curve to be plotted, the data file *data-file* must have the following format.

$$
\begin{array}{cc}
[x_0] & [y_0] \\
[x_1] & [y_1] \\
[x_2] & [y_2] \\
\vdots & \vdots
\end{array}
$$

Table 1. `pstgraph` keys

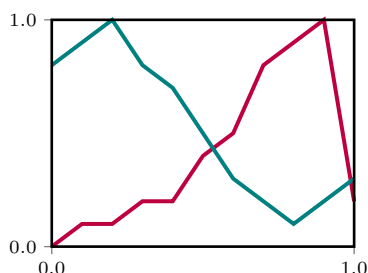| *Key*	*Value*	*Default*	*Description*
`xmin`	*num*	0	Minimum data value on the x axis
`xmax`	*num*	1	Maximum data value on the x axis
`ymin`	*num*	0	Minimum data value on the y axis
`ymax`	*num*	1	Maximum data value on the y axis
`xgriddiv`	*num*	1	Number of vertical grid lines
`ygriddiv`	*num*	1	Number of horizontal grid lines
`gridstyle`	*style*	solid	Style of grid lines
`gridcolor`	*color*	gray	Color of grid lines
`gridwidth`	*dimen*	0.5pt	Width of grid lines
`xticksize`	*num*	0.1	Length of vertical tick lines
`yticksize`	*num*	0.1	Length of horizontal tick lines
`xtagsep`	*num*	0.2	Distance of horizontal tags from the x axis
`ytagsep`	*num*	0.2	Distance of the vertical tags from the y axis
`xtagformat`	*format*	`\scriptstyle`	Format of horizontal tags
`ytagformat`	*format*	`\scriptstyle`	Format of vertical tags
`xlabel`	*text*	—	Label of the x axis
`ylabel`	*text*	—	Label of the y axis
`xlabelsep`	*num*	0.55	Distance of the x label from the x axis
`ylabelsep`	*num*	0.75	Distance of the y label from the y axis
`framewidth`	*dimen*	1pt	Width of the frame
`framecolor`	*color*	black	Color of the frame

The use of brackets around every data value is optional; however, its usage enhances reading the data from the file. The plotted curve is obtained by connecting every point (x_i, y_i) to (x_{i+1}, y_{i+1}) by a straight line segment for all $i = 0, 1, 2, \ldots$. *It is important to notice that all data values in the data file must be nonnegative; otherwise, unexpected results will occur.* Assume $x_{min} \leq x_i \leq x_{max}$ and $y_{min} \leq y_i \leq y_{max}$ for all $i = 0, 1, 2, \ldots$. If either $x_{min} < 0$ or $y_{min} < 0$, I suggest the following solution. Generate the data file as follows.

$$
\begin{array}{cc}
[x_0 - x_{min}] & [y_0 - y_{min}] \\
[x_1 - x_{min}] & [y_1 - y_{min}] \\
[x_2 - x_{min}] & [y_2 - y_{min}] \\
\vdots & \vdots
\end{array}
$$

Then, set `xmin=`x_{min}, `xmax=`x_{max}, `ymin=`y_{min}, and `ymax=`y_{max}. This solution works because the portions of `pstgraph` and `\pstfileplot` codes responsible for scaling and drawing the curve depend only on the differences `xmax − xmin` and `ymax − ymin`. This solution is, in fact, equivalent to moving the origin of the xy-plane to the point (x_{min}, y_{min}). I am working on automating this process.
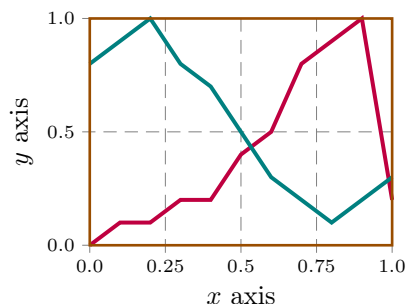
2   Examples

In this section, we review some examples.


```
1  \begin{pstgraph}(4,3)
2    \psset{linewidth=1.5pt}
3    \pstfileplot[linecolor=purple]{data1.dat}
4    \pstfileplot[linecolor=teal]{data2.dat}
5  \end{pstgraph}
```
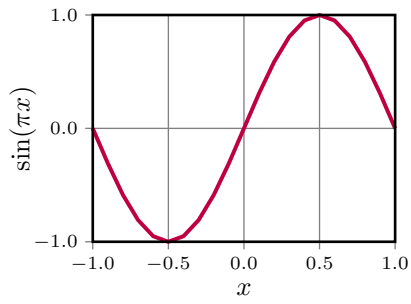


```
1  \setpstgraph{gridstyle=dashed,%
2  gridwidth=.2pt,framecolor=orange!60!black}
3  \begin{pstgraph}[xgriddiv=4,ygriddiv=2](4,3)
4    \psset{linewidth=1.5pt}
5    \pstfileplot[linecolor=purple]{data1.dat}
6    \pstfileplot[linecolor=teal]{data2.dat}
7    \pstlabel{$x$ axis}{$y$ axis}
8  \end{pstgraph}
```

Now, assume we would like to plot the curve of $f(x) = \sin(\pi x)$ from $x = -1$ to $x = 1$. First, we generate a data file containing the points of the curve $y = \sin(\pi(x-1)) + 1$ in which x varies from 0 to 2. Notice that the coordinates of all points are nonnegative. Assuming the data file is `data3.dat`, we plot the curve as follows.

```
1  \setpstgraph{xmin=-1,xmax=1,ymin=-1,ymax=1,%
2  xgriddiv=4,ygriddiv=2}
3  \begin{pstgraph}(4,3)
4    \psset{linewidth=1.5pt}
5    \pstfileplot[linecolor=purple]{data3.dat}
6    \pstlabel{$x$}{$\sin(\pi x)$}
7  \end{pstgraph}
```