

The gridSVG package

Paul Murrell

November 17, 2003

Introduction

This package is an experiment in writing a graphics device, purely in R code, for the grid graphics system. The specific device implemented is for the W3C SVG (Scalable Vector Graphics) format, but there is also some effort at a general device interface that would support other specific devices.

User Interface

There are three functions of interest to the user:

`grid.hyperlink` takes a grid `grob` and turns it into an object of class `linked.grob`, with an associated `href`. This allows the association of hyperlinks with elements of a grid graphic. See `gridSVG/tests/testlink.R` for examples.

`grid.animate` allows the user to associate a duration (plus some other things) with a grid `unit`. This allows a grid graphic element to be animated. See `gridSVG/tests/testanimate.R`, `testpendulum.R` and `testball.R` for examples.

`gridToSVG()` saves the current grid graphic to an SVG file. See the `gridSVG/tests` directory for examples of what can be done. See the section “Known Problems” below for things that are not yet supported.

In addition to these functions, `gridSVG` supports alpha-transparency by respecting the `alpha` graphical parameter which can be specified in a `grid gpar` object. For example, the following code produces overlapping transparent circles¹:

```
> push.viewport(viewport(gp = gpar(col = "black", fill = NA)))
> grid.circle(x = 0.33, r = unit(2, "inches"), gp = gpar(alpha = 0.3,
+   fill = "red"))
> grid.circle(x = 0.67, r = unit(2, "inches"), gp = gpar(alpha = 0.3,
```

¹The `push.viewport()` call is currently necessary to set some default values. It may be possible to remove this in future versions.

```
+     fill = "green"))
> pop.viewport()
> gridToSVG()
```

Internal Structure

There are seven `.R` files in the `gridSVG/R` directory, corresponding to the seven different things that `gridSVG` aims to provide:

dev.R This contain (S4 methods) code defining a generic R-level graphics device interface. In other words, generic functions that may be called by a graphics system (such as `grid`), and that a graphics device (such as an SVG device) should provide methods for.

griddev.R Code for running through the `grid` display list and calling generic device functions.

devsvg.R Code implementing SVG methods for the generic device interface.

svg.R A set of R-level functions for producing SVG output. Callable directly (see, e.g., `gridSVG/tests/testsvg.R`), but mostly just called by code in `devsvg.R`.

gridsvg.R The function `gridToSVG()`.

hyper.R Code implementing the `linked.grob` class – i.e., an extension of the standard `grid grob` that supports hyperlinks. Includes the function `grid.hyperlink()`.

animate.R Code implementing the `time.unit` class – i.e., an extension of the standard `grid unit` that supports animation. Includes the function `grid.animate()`.

Known Problems

This package is a partial implementation of several ideas. This section describes some of the known holes in the implementation.

Plotting Symbols

Only `pch=1` and `pch=3` are currently supported. This is just a matter of filling in the other options.

Mathematical Annotation

The use of things like `grid.text(expression(x[i]))` is supported in the main R graphics engine. `gridSVG` bypasses that and so does not support mathematical annotation (and probably never will!).

Time unit arithmetic

Arithmetic with time units is not yet supported. I had a go at it, and I think the basic idea is sound, but I think the problem is that S3 method dispatch cannot handle it (see `WAS.Ops.time.unit` in `animate.R`). This will have to wait until `grid` has been reimplemented using S4 methods.

This is a fairly serious limitation as it means that the result of any arithmetic involving a time unit will NOT be a time unit. This means that the current simple implementation of grid points and non-left-bottom-justified rectangles (for example), cannot be animated.