R Microplots in Tables with the `latex()` Function

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Microplots (sparklines) are often used within cells of a tabular array.

We describe several R functions that simplify the use of microplots
within LaTeX tables constructed in R with `Hmisc::latex` or a similar function.
within HTML tables constructed with the **htmlTable** package.

We show examples using **base** graphics, **lattice** graphics, and **ggplot2** graphics.

These functions work in LaTeX documents constructed
directly in LaTeX,
with the R packages **Sweave**, **knitr**, or **rmarkdown**,
and with the Emacs package **org-mode**.

1 Boxplots of `iris` data with `lattice` and `latticeExtra`

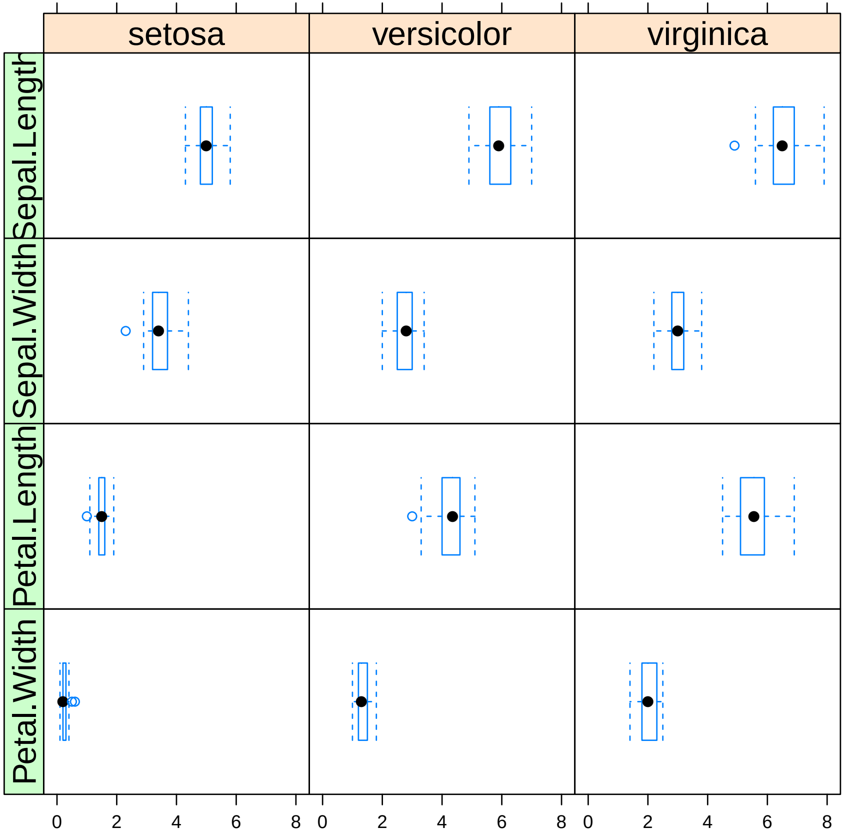
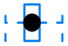
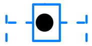
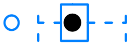
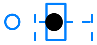
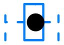
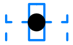
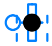
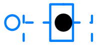
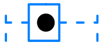
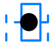


Figure 1: `useOuterStrips(`

```
bwplot(~ Sepal.Length + Sepal.Width + Petal.Length + Petal.Width
| Species, data=iris, outer=TRUE, as.table=TRUE))
```

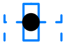
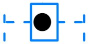
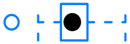
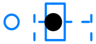
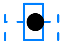
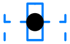
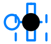
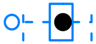
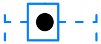
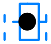
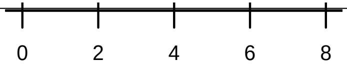
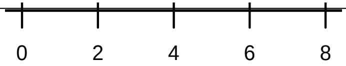
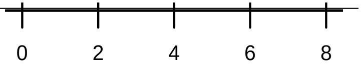
2 Individual boxes placed into a LaTeX `tabular` environment

Table 1: Measurement by Species

Measurement	setosa	versicolor	virginica
Sepal.Length			
Sepal.Width			
Petal.Length			
Petal.Width			

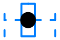
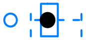
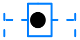
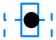
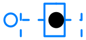
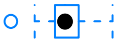
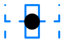
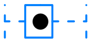
3 Individual boxes in a table with the *x*-scale displayed

Table 2: Measurement by Species, with x-scale

Measurement	setosa	versicolor	virginica
Sepal.Length			
Sepal.Width			
Petal.Length			
Petal.Width			
			

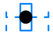
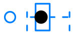
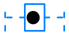
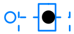
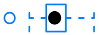
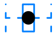
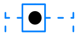
4 Transposed LaTeX table

Table 3: Species by Measurement

Species	Sepal.Length	Sepal.Width	Petal.Length	Petal.Width
setosa				
versicolor				
virginica				

5 Individual boxes embedded into a more interesting table

Table 4: Five Number Summary and Boxplots for each Species and Measurement

Species		**Five Number Summary**					
	Measurement	min	Q1	med	Q3	max	Box Plots
setosa							
	Sepal.Length	4.3	4.8	5.00	5.2	5.8	
	Sepal.Width	2.3	3.2	3.40	3.7	4.4	
	Petal.Length	1.0	1.4	1.50	1.6	1.9	
	Petal.Width	0.1	0.2	0.20	0.3	0.6	
versicolor							
	Sepal.Length	4.9	5.6	5.90	6.3	7.0	
	Sepal.Width	2.0	2.5	2.80	3.0	3.4	
	Petal.Length	3.0	4.0	4.35	4.6	5.1	
	Petal.Width	1.0	1.2	1.30	1.5	1.8	
virginica							
	Sepal.Length	4.9	6.2	6.50	6.9	7.9	
	Sepal.Width	2.2	2.8	3.00	3.2	3.8	
	Petal.Length	4.5	5.1	5.55	5.9	6.9	
	Petal.Width	1.4	1.8	2.00	2.3	2.5	

6 How does it work?

There are two tasks. The **microplot** package provides functions for each task.

1. Isolate the contents of each panel of a multipanel graph into its own `pdf` file.

lattice: functions `layoutHeightsCollapse` and `layoutWidthsCollapse`
and argument `layout=c(1,1)`
ggplot2: function `theme_collapse` and loop through panels
base: adjust `par` arguments and `xlim` and `ylim`

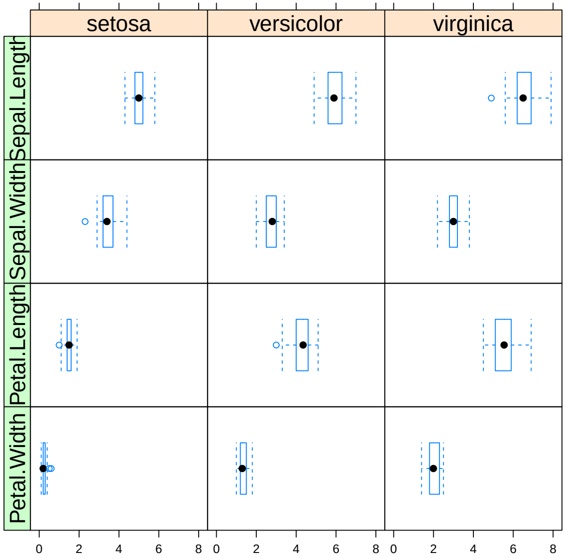
2. Automate construction of the graphics statements.

LaTeX: `as.includegraphics` function
HTML: `as.htmlimg` function
org-mode: `as.orgtable` and `as.orgfile` functions

7 lattice

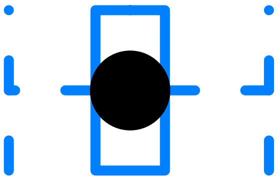
```
## boxplot matrix of iris data
irisBW <-
  bwplot(~ Sepal.Length + Sepal.Width + Petal.Length + Petal.Width |
           Species,
         data=iris, outer=TRUE, as.table=TRUE,
         scales=list(alternating=FALSE),
         xlab=NULL,
         par.strip.text=list(cex=1.5))

## pdf of boxplot matrix
pdf("irisBW.pdf")
useOuterStrips(irisBW)
suppress <- dev.off()
```



```
## twelve individual boxplots without axes
irisBW.update <-
update(irisBW,
       xlab=NULL,
       par.settings=list(
         layout.heights=layoutHeightsCollapse(),
         layout.widths=layoutWidthsCollapse(),
         axis.line=list(col="transparent")),
       layout=c(1,1)
       )

## create 12 pdf files, one per boxplot
pdf("irisBW%03d.pdf", onefile=FALSE, height=.4, width=1.6)  ## inch
irisBW.update
suppress <- dev.off()
```



The first panel in file `irisBW001.pdf` is shown here.

The functions `layoutHeightsCollapse` (shown here) and `layoutWidthsCollapse` set the vertical and horizontal space for everything in a plot, except the panel itself, to 0.

```
> layoutHeightsCollapse
function (...)
{
    x.settings <- lattice::trellis.par.get()$layout.heights
    x.settings[] <- 0
    x.settings$panel = 1
    inputs <- list(...)
    if (length(inputs))
        x.settings[names(inputs)] <- inputs
    x.settings
}
```

The function `as.includegraphics` wraps the graph file names into the format used by the LaTeX **graphicx** package.

```
> graphnames[1:2]
[1] "irisBW001.pdf" "irisBW002.pdf"
> graphicsnames <- as.includegraphics(graphnames[1:12], wd=".")
> dim(graphicsnames) <- c(4,3)
> graphicsnames[1:2, 1]
[1] "\\includegraphics[height=1em]{./irisBW001.pdf}"
[2] "\\includegraphics[height=1em]{./irisBW002.pdf}"
```

These values are placed into an ordinary matrix or dataframe and sent to the `Hmisc::latex` function to create a latex file fragment that can be input with the LaTeX `\input` macro.

```
BWMS.latex <- Hmisc::latex(graphicsnames)
BWMS.latex$style <- "graphicx"
```

8 More Information on Microplots

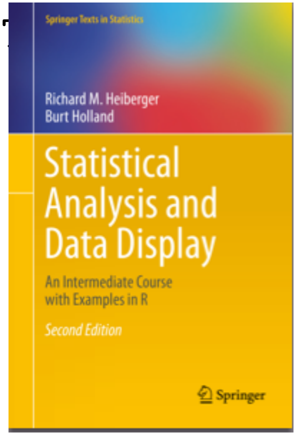
The **microplot** package shows simple examples with **lattice**, **ggplot2**, and **base** graphics.

The **microplot** package shows simple examples in LaTeX using the R packages **Sweave**, **knitr**, and **rmarkdown**, and the Emacs package **org-mode**.

The **microplot** package shows simple examples in HTML using the R package **rmarkdown** and the Emacs package **org-mode**.

```
utils::install.packages("microplot", dependencies=
## this includes HH and its dependencies
```

The **HH** package is designed to accompany
Statistical Analysis and Data Display, Second Edition
Richard M. Heiberger and Burt Holland
Springer 2015
`http://www.springer.com/us/book/9781493921218`


Springer Texts in Statistics
Richard M. Heiberger
Burt Holland
Statistical Analysis and Data Display
An Intermediate Course with Examples in R
Second Edition
Springer