

How to Present Tables in Plot Devices

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Chicago R User Group Meetup: R Output

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Overview

Graphics in R are plotted on a graphics device

- Depending on the OS, in an interactive R session the default device is the screen, using `windows()`, `X11()`, or `quartz()`.
- Common graphics file formats use the `bmp()`, `jpeg()`, `png()`, and `tiff()` devices.
- Other useful file devices include `postscript()`, `pdf()`, `pictex()`, `xfig()`, and `bitmap()`.

Why would we display tabular data on a plot device?

- Reviewing results in a terminal isn't usually effective
- Garner benefits from formatting
- Combining graphics and tables can be very powerful

Some solutions, with a focus on `textplot`

Set up an example

```
> library('PerformanceAnalytics')
> data(managers)
> #managers=read.csv("/home/peter/dev/R/managers.csv",row.names=1)
> head(managers)
```

	HAM1	HAM2	HAM3	HAM4	HAM5	HAM6	EDHEC	LS	EQ	SP500	TR
1996-01-31	0.0074	NA	0.0349	0.0222	NA	NA			NA	0.0340	
1996-02-29	0.0193	NA	0.0351	0.0195	NA	NA			NA	0.0093	
1996-03-31	0.0155	NA	0.0258	-0.0098	NA	NA			NA	0.0096	
1996-04-30	-0.0091	NA	0.0449	0.0236	NA	NA			NA	0.0147	
1996-05-31	0.0076	NA	0.0353	0.0028	NA	NA			NA	0.0258	
1996-06-30	-0.0039	NA	-0.0303	-0.0019	NA	NA			NA	0.0038	

```

      US 10Y TR  US 3m TR
1996-01-31  0.00380 0.00456
1996-02-29 -0.03532 0.00398
1996-03-31 -0.01057 0.00371
1996-04-30 -0.01739 0.00428
1996-05-31 -0.00543 0.00443
1996-06-30  0.01507 0.00412

> dim(managers)

[1] 132 10

> colnames(managers)
```

[1]	"HAM1"	"HAM2"	"HAM3"	"HAM4"	"HAM5"					
[6]	"HAM6"	"EDHEC	LS	EQ"	"SP500	TR"	"US 10Y	TR"	"US 3m	TR"

Set up an example

```
> manager.col = 1
> peers.cols = c(2,3,4,5,6)
> indexes.cols = c(7,8)
> Rf.col = 10
> peer.colorset=c("red", rep("darkorange", 2), rep("gray", 5))
> ham1.downside = t(table.DownsideRisk(managers[,c(manager.col,
+ indexes.cols, peers.cols)],Rf=.03/12))
```

Construct a table example

```
> ham1.downside
```

Semi Deviation Gain Deviation Loss Deviation

HAM1	0.0191	0.0169	0.0211
EDHEC LS EQ	0.0145	0.0143	0.0118
SP500 TR	0.0325	0.0250	0.0300
HAM2	0.0201	0.0347	0.0107
HAM3	0.0237	0.0290	0.0191
HAM4	0.0395	0.0311	0.0365
HAM5	0.0324	0.0313	0.0324
HAM6	0.0175	0.0149	0.0128

Downside Deviation (MAR=10%) Downside Deviation (Rf=3%)

HAM1	0.0178	0.0154
EDHEC LS EQ	0.0138	0.0109
SP500 TR	0.0323	0.0295
HAM2	0.0164	0.0129
HAM3	0.0214	0.0185
HAM4	0.0381	0.0353
HAM5	0.0347	0.0316
HAM6	0.0161	0.0133

Downside Deviation (0%) Maximum Drawdown Historical VaR (95%)

HAM1	0.0145	0.1518	-0.0258
EDHEC LS EQ	0.0098	0.1075	-0.0203
SP500 TR	0.0283	0.4473	-0.0669
HAM2	0.0116	0.2399	-0.0294
HAM3	0.0174	0.2894	-0.0425
HAM4	0.0341	0.2874	-0.0799
HAM5	0.0304	0.3405	-0.0733
HAM6	0.0121	0.0788	-0.0341

gplots::textplot

Gregory R. Warnes' package, gplots, includes the textplot function

- Displays text output in a graphics window
- Provides the equivalent of print
- Creates a new plot and displays a table using the largest font that will fit in the plotting region
- Several other good things in the package, too

gplots:::textplot example

```
> library(gplots)
> #args(gplots:::textplot)
> gplots:::textplot(ham1.downside); box(col="lightblue")
```

Deviation	Gain Deviation	Loss Deviation	Downside Deviation (MAR=10%)	Downside Deviation (Rf=3%)	Downside Deviation (0%)	Maximum Drawdown	Historical VaR (95%)	Historical ES (95%)	Modif
0.0191	0.0169	0.0211	0.0178	0.0154	0.0145	0.1518	-0.0258	-0.0513	
0.0145	0.0143	0.0118	0.0138	0.0109	0.0098	0.1075	-0.0203	-0.0342	
0.0325	0.025	0.03	0.0323	0.0295	0.0283	0.4473	-0.0669	-0.0933	
0.0201	0.0347	0.0107	0.0164	0.0129	0.0116	0.2399	-0.0294	-0.0331	
0.0237	0.029	0.0191	0.0174	0.0165	0.0174	0.2654	-0.0425	-0.0555	
0.0395	0.0311	0.0365	0.0381	0.0353	0.0341	0.2874	-0.0799	-0.1122	
0.0354	0.0313	0.0324	0.0347	0.0316	0.0304	0.3405	-0.0733	-0.1023	
0.0175	0.0149	0.0128	0.0161	0.0133	0.0121	0.0788	-0.0341	-0.0392	

Hmisc::format.df

The `Hmisc` package by Frank E. Harrell, Jr., and Richard M. Heiberger contains several functions useful for data analysis

- Includes functions for advanced table making, character string manipulation, and conversion of S objects to LaTeX code, and many others.
- `format.df` does rounding and decimal alignment for `data.frames`, similar to `format` in `base`
- Generates a character matrix containing the formatted data
- Useful for formatting tables in LaTeX or HTML, as well

Hmisc:::format.df example

```
> library(Hmisc)
> args(format.df)

function (x, digits, dec = NULL, rdec = NULL, cdec = NULL, numeric.dollar = !dcolumn,
  na.blank = FALSE, na.dot = FALSE, blank.dot = FALSE, col.just = NULL,
  cdot = FALSE, dcolumn = FALSE, matrix.sep = " ", scientific = c(-4,
    4), math.row.names = FALSE, math.col.names = FALSE, double.slash = FALSE,
  format.Date = "%m/%d/%Y", format.POSIXt = "%m/%d/%Y %H:%M:%OS",
  ...)
NULL

> ham1.f.downside = format.df(ham1.downside, na.blank=TRUE, numeric.dollar = FALSE, cdec=rep(4,d
```

Hmisc::format.df example

```
> ham1.f.downside
```

	Semi Deviation	Gain Deviation	Loss Deviation
HAM1	"0.0191"	"0.0169"	"0.0211"
EDHEC LS EQ	"0.0145"	"0.0143"	"0.0118"
SP500 TR	"0.0325"	"0.0250"	"0.0300"
HAM2	"0.0201"	"0.0347"	"0.0107"
HAM3	"0.0237"	"0.0290"	"0.0191"
HAM4	"0.0395"	"0.0311"	"0.0365"
HAM5	"0.0324"	"0.0313"	"0.0324"
HAM6	"0.0175"	"0.0149"	"0.0128"

	Downside Deviation (MAR=10\\%)	Downside Deviation (Rf=3\\%)
HAM1	"0.0178"	"0.0154"
EDHEC LS EQ	"0.0138"	"0.0109"
SP500 TR	"0.0323"	"0.0295"
HAM2	"0.0164"	"0.0129"
HAM3	"0.0214"	"0.0185"
HAM4	"0.0381"	"0.0353"
HAM5	"0.0347"	"0.0316"
HAM6	"0.0161"	"0.0133"

	Downside Deviation (0\\%)	Maximum Drawdown	Historical VaR (95\\%)
HAM1	"0.0145"	"0.1518"	"-0.0258"
EDHEC LS EQ	"0.0098"	"0.1075"	"-0.0203"
SP500 TR	"0.0283"	"0.4473"	"-0.0669"
HAM2	"0.0116"	"0.2399"	"-0.0294"
HAM3	"0.0174"	"0.2894"	"-0.0425"
HAM4	"0.0341"	"0.2874"	"-0.0799"
HAM5	"0.0304"	"0.3405"	"-0.0733"
HAM6	"0.0121"	"0.0788"	"-0.0341"

PerformanceAnalytics::textplot

The PerformanceAnalytics package extends the `gplots::textplot` function

- Equivalent of `print` except that the output is displayed as a plot
- Fixes some of the layout math
- Adds column and row name word wrapping
- Adds color to the table elements
- Adds vertical alignment for headers and data

PerformanceAnalytics::textplot example

```
> require(PerformanceAnalytics)
> args(PerformanceAnalytics::textplot)

function (object, halign = "center", valign = "center", cex,
  max.cex = 1, cmar = 2, rmar = 0.5, show.rownames = TRUE,
  show.colnames = TRUE, hadj = 1, vadj = NULL, row.valign = "center",
  heading.valign = "bottom", mar = c(0, 0, 0, 0) + 0.1, col.data = par("col"),
  col.rownames = par("col"), col.colnames = par("col"), wrap = TRUE,
  wrap.colnames = 10, wrap.rownames = 10, ...)
NULL
```

PerformanceAnalytics::textplot example

```
> PerformanceAnalytics::textplot(ham1.f.downside, halign = "center", valign = "top", row.valign = "top",
> box(col="lightblue")
```

	Semi Deviation	Gain Deviation	Loss Deviation	Downside Deviation (MAR=10%)	Downside Deviation (Rf=3%)	Downside Deviation (0%)	Maximum Drawdown	Historical VaR (95%)	Historical ES (95%)	Modified VaR (95%)	Modified ES (95%)
HAM1	0.0191	0.0169	0.0211	0.0178	0.0154	0.0145	0.1518	-0.0258	-0.0513	-0.0342	-0.0310
EDHEC LS EQ	0.0145	0.0143	0.0118	0.0138	0.0109	0.0098	0.1075	-0.0203	-0.0342	-0.0235	-0.0346
SP500 TR	0.0325	0.0250	0.0300	0.0323	0.0295	0.0283	0.4473	-0.0669	-0.0933	-0.0683	-0.0944
HAM2	0.0201	0.0347	0.0107	0.0164	0.0129	0.0116	0.2399	-0.0294	-0.0331	-0.0276	-0.0314
HAM3	0.0237	0.0290	0.0191	0.0214	0.0185	0.0174	0.2894	-0.0425	-0.0555	-0.0368	-0.0440
HAM4	0.0395	0.0311	0.0365	0.0381	0.0353	0.0341	0.2874	-0.0799	-0.1122	-0.0815	-0.1176
HAM5	0.0324	0.0313	0.0324	0.0347	0.0316	0.0304	0.3405	-0.0733	-0.1023	-0.0676	-0.0974
HAM6	0.0175	0.0149	0.0128	0.0161	0.0133	0.0121	0.0788	-0.0341	-0.0392	-0.0298	-0.0390

Other Possibilities

What else is available?

- A very promising package presented at useR! 2010, `tabular`
- Dump results to a spreadsheet, perhaps with `XLConnect`
- Finally learn \LaTeX and Sweave
- What did I miss? Any feedback would be much appreciated ...