How to Present Tables in Plot Devices

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Chicago R User Group Meetup: R Output

Outline

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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	0.0270	0.0169	0.0211
EDHEC LS EQ	0.0212	0.0143	0.0118
SP500 TR	0.0486	0.0250	0.0300
HAM2	0.0258	0.0347	0.0107
HAM3	0.0319	0.0290	0.0191
HAM4	0.0576	0.0311	0.0365
HAM5	0.0456	0.0313	0.0324
HAM6	0.0260	0.0149	0.0128

	Downside Deviation (MAR=10%)	Downside Deviation (Rf=3%)
HAM1	0.0273	0.0281
EDHEC LS EQ	0.0210	0.0175
SP500 TR	0.0484	0.0479
HAM2	0.0226	0.0190
HAM3	0.0313	0.0295
HAM4	0.0585	0.0562
HAM5	0.0464	0.0463
HAM6	0.0253	0.0238

	Downside Deviation (0%)	Maximum Drawdown	Historical VaR (95%)
HAM1	0.0291	0.1518	-0.0258
EDHEC LS EQ	0.0177	0.1075	-0.0203
SP500 TR	0.0474	0.4473	-0.0669
HAM2	0.0171	0.2399	-0.0294
HAM3	0.0291	0.2894	-0.0425
HAM4	0.0548	0.2874	-0.0799
HAM5	0.0451	0.3405	-0.0733
HAM6	0.0229	0.0788	-0.0341

Historical ES (95%)	Modified VaR (95%)	Modified ES (95%)

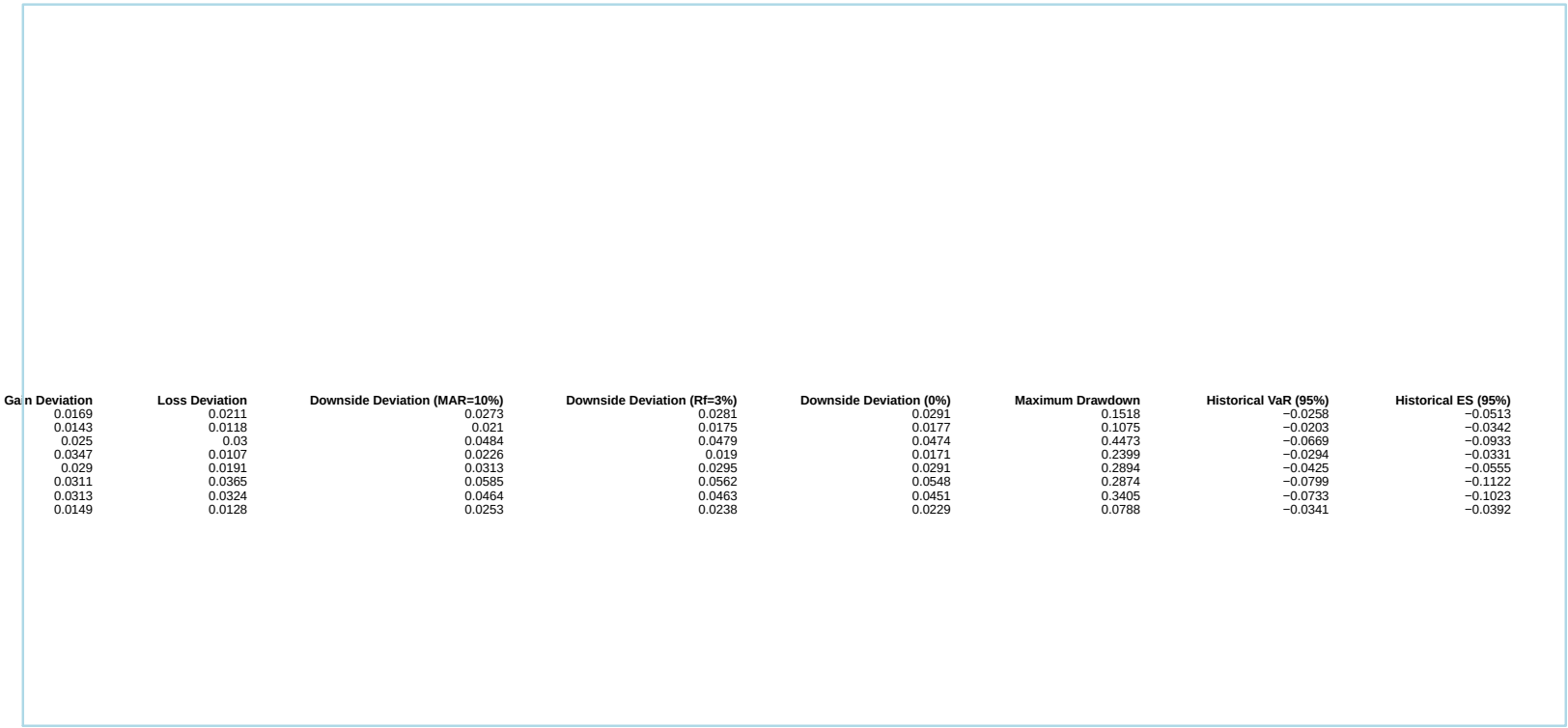
gplots:::textplot

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
0.027	0.0169	0.0211	0.0273	0.0281	0.0291	0.1518	−0.0258	−0.0513	
0.0212	0.0143	0.0118	0.021	0.0175	0.0177	0.1075	−0.0203	−0.0342	
0.0486	0.025	0.03	0.0484	0.0479	0.0474	0.4473	−0.0669	−0.0933	
0.0258	0.0347	0.0107	0.0226	0.019	0.0171	0.2399	−0.0294	−0.0331	
0.0319	0.029	0.0191	0.0313	0.0295	0.0291	0.2894	−0.0425	−0.0555	
0.0576	0.0311	0.0365	0.0585	0.0562	0.0548	0.2874	−0.0799	−0.1122	
0.0456	0.0313	0.0324	0.0464	0.0463	0.0451	0.3405	−0.0733	−0.1023	
0.026	0.0149	0.0128	0.0253	0.0238	0.0229	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 formating 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,
    ...)
NULL

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

Hmisc:::format.df example

> ham1.f.downside

```
           Semi Deviation Gain Deviation Loss Deviation
HAM1         "0.0270"       "0.0169"       "0.0211"
EDHEC LS EQ "0.0212"       "0.0143"       "0.0118"
SP500 TR    "0.0486"       "0.0250"       "0.0300"
HAM2         "0.0258"       "0.0347"       "0.0107"
HAM3         "0.0319"       "0.0290"       "0.0191"
HAM4         "0.0576"       "0.0311"       "0.0365"
HAM5         "0.0456"       "0.0313"       "0.0324"
HAM6         "0.0260"       "0.0149"       "0.0128"
           Downside Deviation (MAR=10%) Downside Deviation (Rf=3%)
HAM1         "0.0273"                     "0.0281"
EDHEC LS EQ "0.0210"                     "0.0175"
SP500 TR    "0.0484"                     "0.0479"
HAM2         "0.0226"                     "0.0190"
HAM3         "0.0313"                     "0.0295"
HAM4         "0.0585"                     "0.0562"
HAM5         "0.0464"                     "0.0463"
HAM6         "0.0253"                     "0.0238"
           Downside Deviation (0%) Maximum Drawdown Historical VaR (95%)
HAM1         "0.0291"                "0.1518"         "-0.0258"
EDHEC LS EQ "0.0177"                "0.1075"         "-0.0203"
SP500 TR    "0.0474"                "0.4473"         "-0.0669"
HAM2         "0.0171"                "0.2399"         "-0.0294"
HAM3         "0.0291"                "0.2894"         "-0.0425"
HAM4         "0.0548"                "0.2874"         "-0.0799"
HAM5         "0.0451"                "0.3405"         "-0.0733"
HAM6         "0.0229"                "0.0788"         "-0.0341"
           Historical ES (95%) Modified VaR (95%) Modified ES (95%)
```

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
> 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	0.0270	0.0169	0.0211	0.0273	0.0281	0.0291	0.1518	−0.0258	−0.0513	−0.0342	−0.0610
EDHEC LS EQ	0.0212	0.0143	0.0118	0.0210	0.0175	0.0177	0.1075	−0.0203	−0.0342	−0.0235	−0.0346
SP500 TR	0.0486	0.0250	0.0300	0.0484	0.0479	0.0474	0.4473	−0.0669	−0.0933	−0.0683	−0.0944
HAM2	0.0258	0.0347	0.0107	0.0226	0.0190	0.0171	0.2399	−0.0294	−0.0331	−0.0276	−0.0614
HAM3	0.0319	0.0290	0.0191	0.0313	0.0295	0.0291	0.2894	−0.0425	−0.0555	−0.0368	−0.0440
HAM4	0.0576	0.0311	0.0365	0.0585	0.0562	0.0548	0.2874	−0.0799	−0.1122	−0.0815	−0.1176
HAM5	0.0456	0.0313	0.0324	0.0464	0.0463	0.0451	0.3405	−0.0733	−0.1023	−0.0676	−0.0974
HAM6	0.0260	0.0149	0.0128	0.0253	0.0238	0.0229	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 ...