

tutorial of wheatmap

This is a tutorial on the usage of wheatmap for generating complex heatmaps in a procedure way.

A heatmap is easy to generate in R. There are many packages like heatmap2, heatmap3, heatmap.plus and ComplexHeatmaps. But many times, I found myself in a situation of plotting a set of heatmaps in a procedure way. And none of the above packages are nimble enough to do color-bar reordering, multiple heatmaps that can be positioned arbitrarily. So I wrote this package for that purpose.

We start with some data

```
library(devtools)
```

```
## Warning: package 'devtools' was built under R version 3.2.5
```

```
load_all('~/tools/wheatmap/wheatmap/')
```

```
## Loading wheatmap
```

```
m <- cbind(matrix(rnorm(20),nrow=4), 5+matrix(rnorm(8),nrow=4))
m2 <- matrix(1:16,nrow=4)
dimnames(m) <- list(c('w','x','y','z'), c('a','b','c','d','e','f','g'))
row.data <- c(1,2,3,1)
col.data <- c(1:6,6)
m
```

```
##           a           b           c           d           e           f           g
## w -0.4688370  1.2393554  0.4344455 -0.2743136 -0.1010725  5.315786  5.111996
## x  0.2427481  0.2716832 -1.2482433  1.6379408 -0.5372462  4.894335  8.551437
## [ reached getOption("max.print") -- omitted 2 rows ]
```

We perform some clustering

```
c <- both.cluster(m)
row.data <- row.data[c$row.clust$order]
col.data <- col.data[c$column.clust$order]
```

We plot one heatmap first

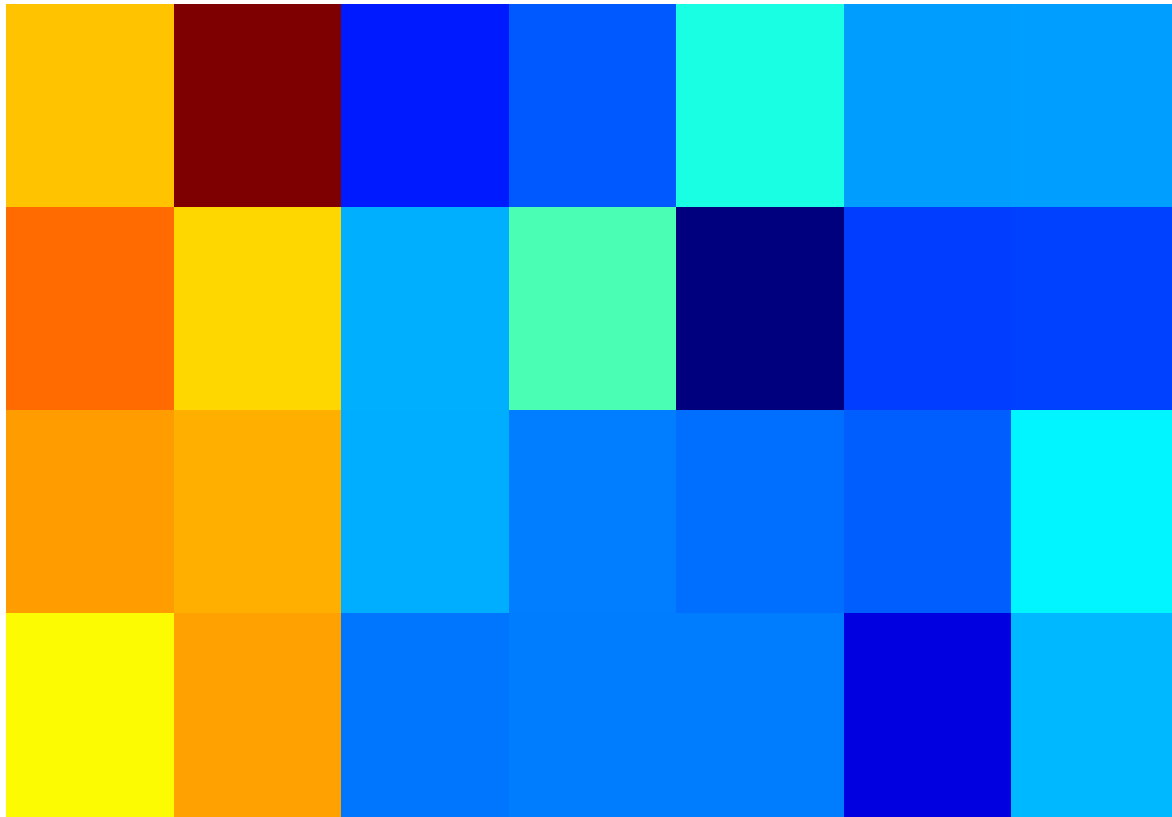
```
load_all('~/tools/wheatmap/wheatmap/')
```

```
## Loading wheatmap
```

```
a <- WHeatmap(c$mat, name='h1')
```

```
## Register WHeatmap: h1.
```

```
a
```

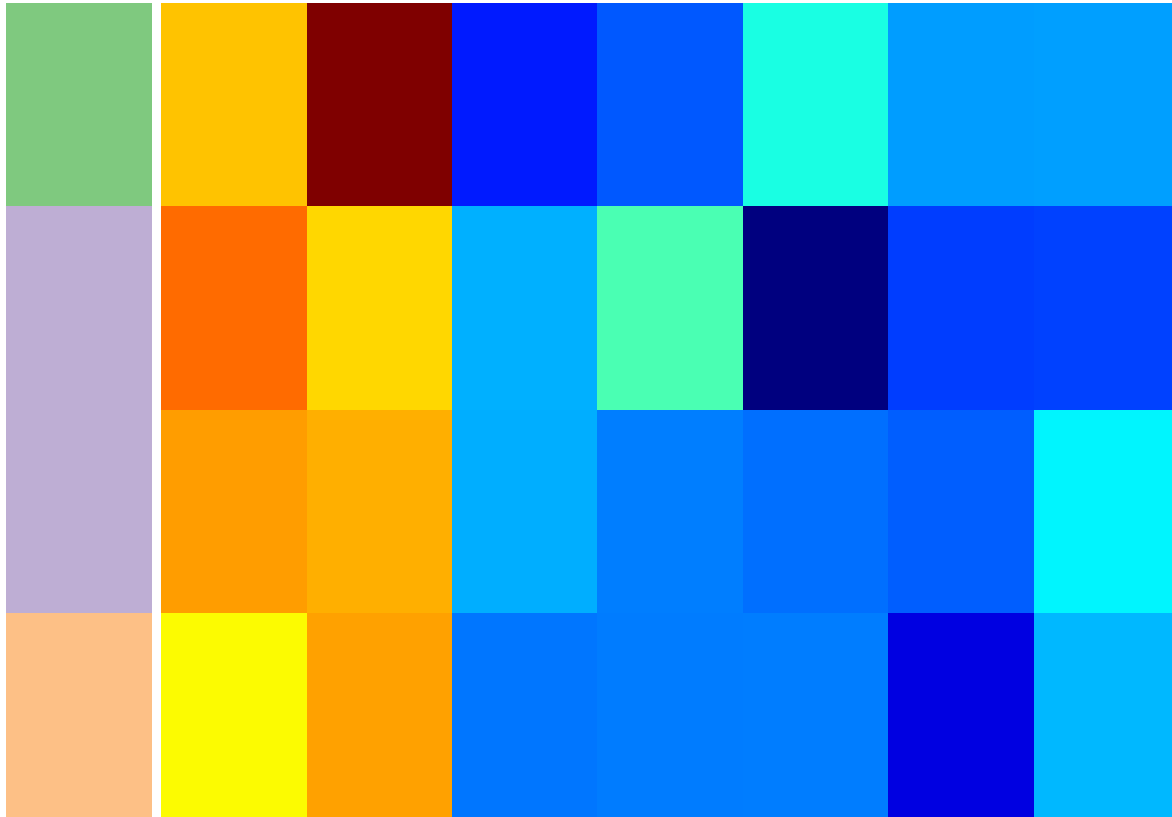


Then we add the left color bar

```
a <- a + WColorBarV(row.data, LeftOf('h1'), 'c1')
```

```
## Register WColorBarV: c1.
```

```
a
```

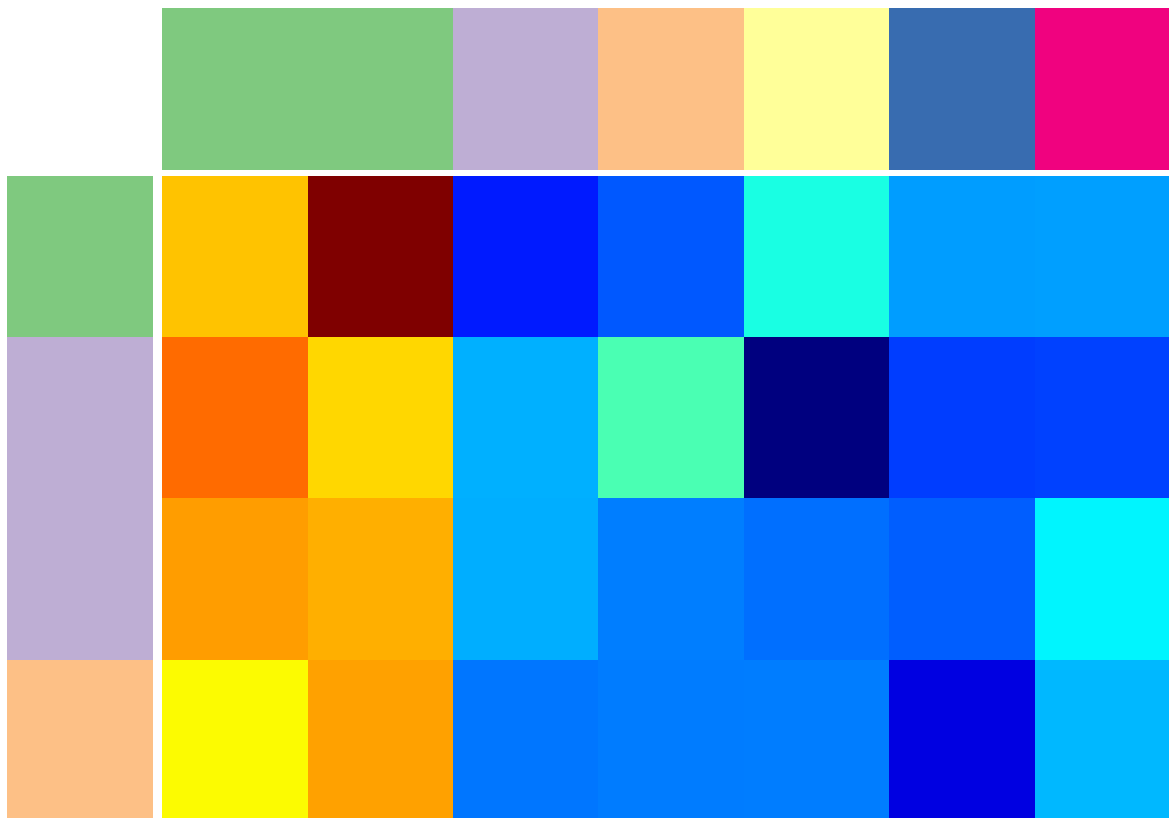


Then the top color bar

```
a <- a + WColorBarH(col.data, TopOf('h1'), 'c2')
```

```
## Register WColorBarH: c2.
```

```
a
```



Then the dendrograms

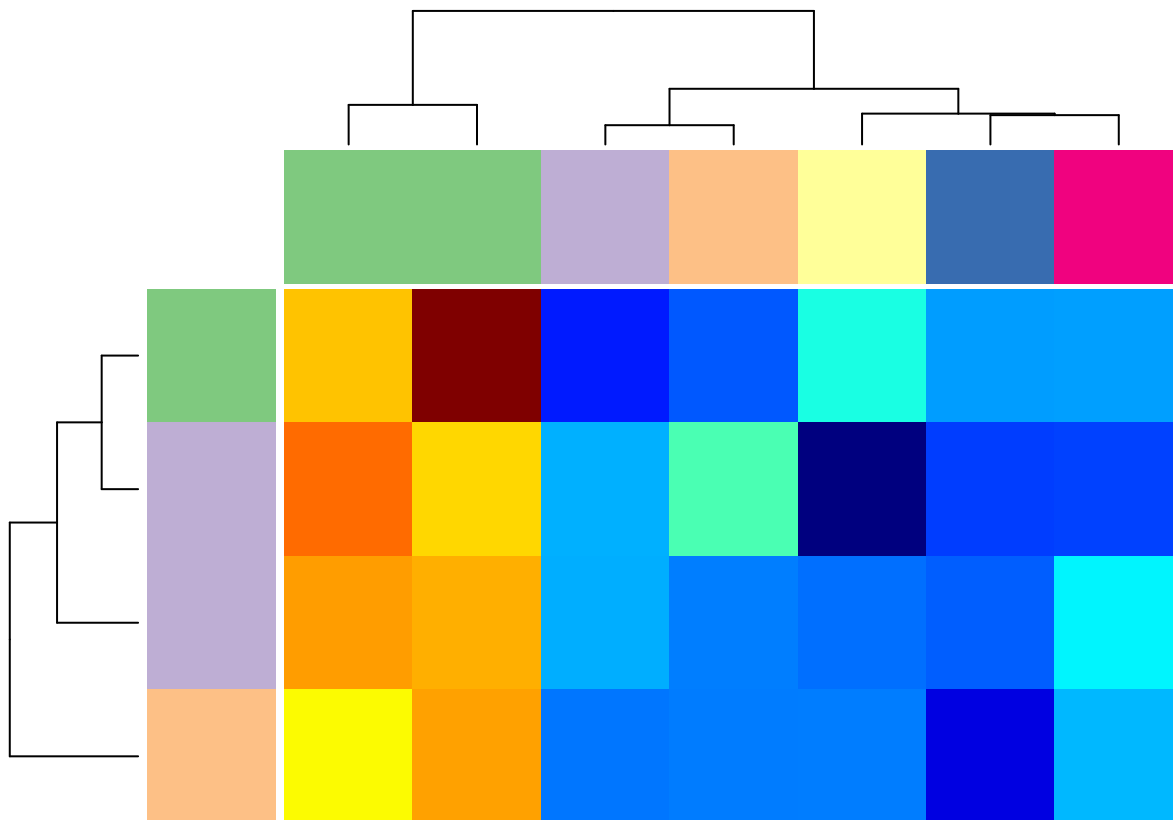
```
a <- a + WDendrogram(c$row.clust, LeftOf('c1'), facing='right')
```

```
## Register WDendrogram: wheatmap.internal.1.
```

```
a <- a + WDendrogram(c$column.clust, TopOf('c2'), facing='bottom')
```

```
## Register WDendrogram: wheatmap.internal.2.
```

```
a
```

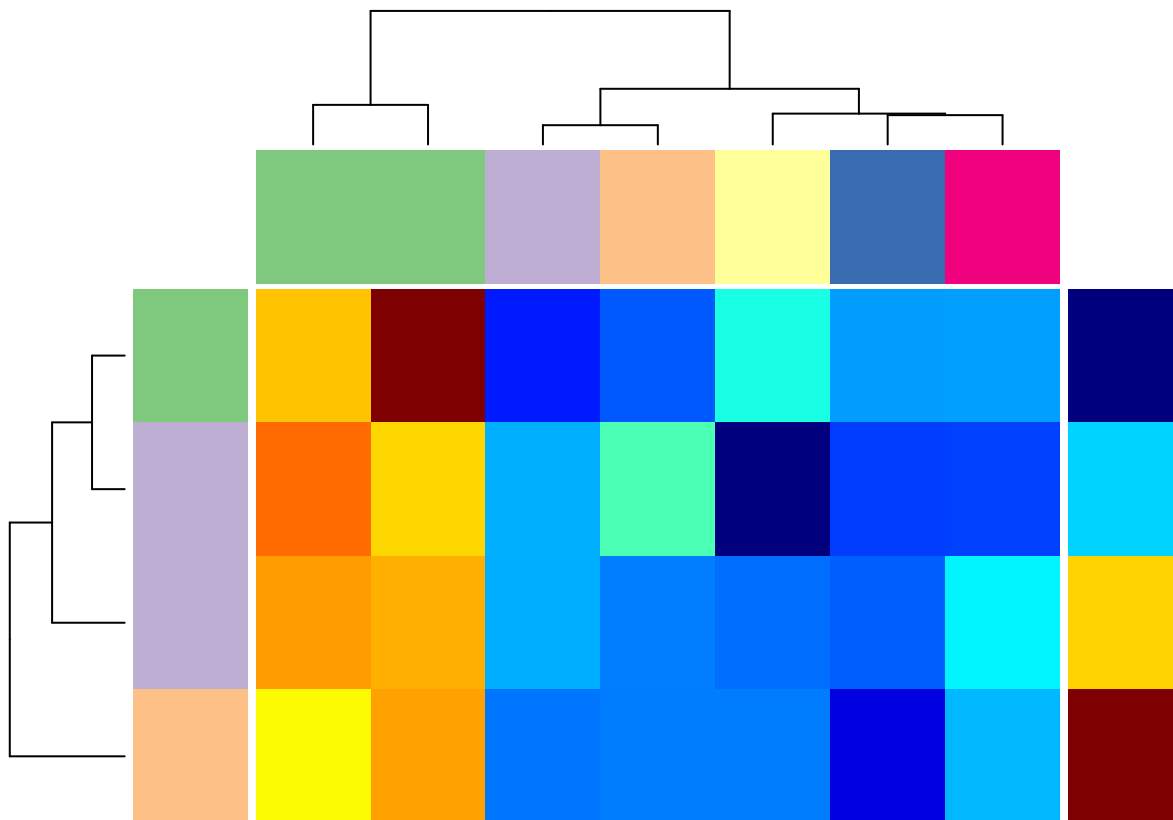


Then another vertical color bar on the right. This one we want to have a continuous scale.

```
a <- a + WColorBarV(1:4, RightOf('h1'), 'c3', continuous=TRUE)
```

```
## Register WColorBarV: c3.
```

```
a
```

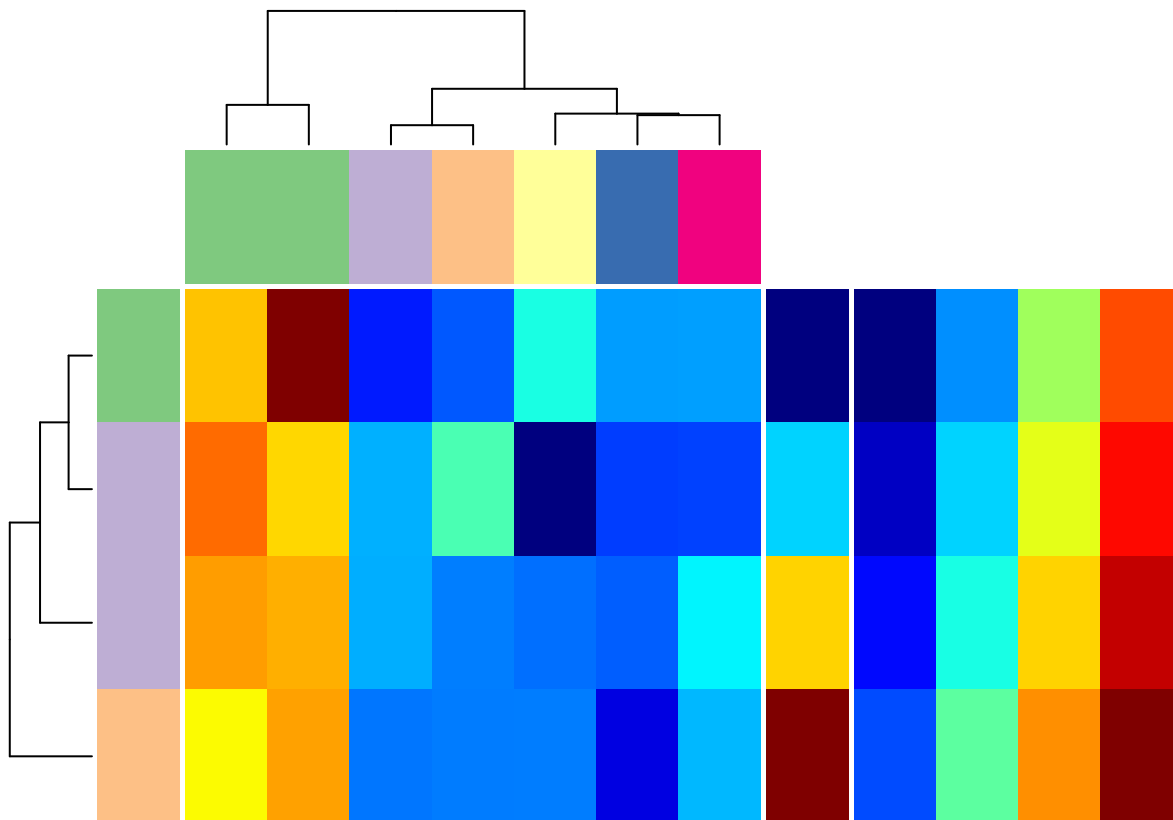


Then another heatmap on the further right

```
a <- a + WHeatmap(m2, RightOf('c3'), 'h2')
```

```
## Register WHeatmap: h2.
```

```
a
```



Now we can merge 3 items we plot and add a horizontal bar below. Note wheatmap automatically computes the split for you. It's the users' responsibility however, to make sure data are alignable.

```
a <- a + WColorBarH(rep(c(1,2,3),each=4), Beneath(WGroupColumn('h1', 'c3', 'h2')), 'c4', cmp=CMPar(brew
```

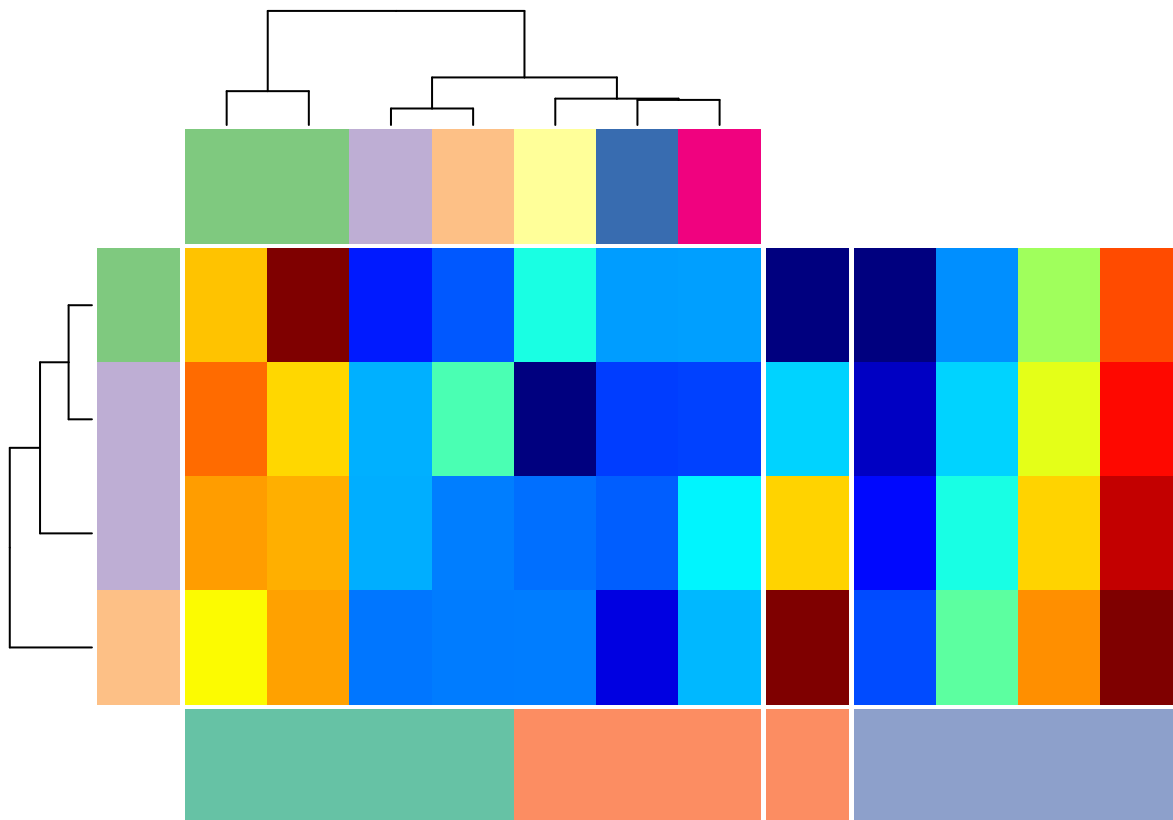
```
## Register WColorBarH: c4.1.
```

```
## Register WColorBarH: c4.2.
```

```
## Register WColorBarH: c4.3.
```

```
## Register WGroup: c4.
```

```
a
```



```
a <- a + WHeatmap(matrix(rep(c(8:1,1:8),4),nrow=4), Beneath('c4', h.aln=WGroupColumn('h1','c3')), 'h3')
```

```
## Register WHeatmap: h3.1.
```

```
## Register WHeatmap: h3.2.
```

```
## Register WGroup: h3.
```

```
a <- a + WHeatmap(matrix(1:4,nrow=2), RightOf('h3', h.scale='h2'), 'h4')
```

```
## Register WHeatmap: h4.
```

```
a <- a + WHeatmap(matrix(1:24,nrow=3), Beneath('h3'), 'h5')
```

```
## Register WHeatmap: h5.1.
```

```
## Register WHeatmap: h5.2.
```

```
## Register WGroup: h5.
```

```
a <- a + WHeatmap(matrix(24:1,nrow=2), Beneath('h5', h.aln=WGroupColumn('h1','c3','h2')), 'h6')
```

```
## Register WHeatmap: h6.1.
```



```
## Register WHeatmap: h6.2.
```

```
## Register WHeatmap: h6.3.
```

```
## Register WGroup: h6.
```

```
a <- a + WLegendV('c1', RightOf('h6.3'), 'l1')
```

```
## Register WLegendV: l1.
```

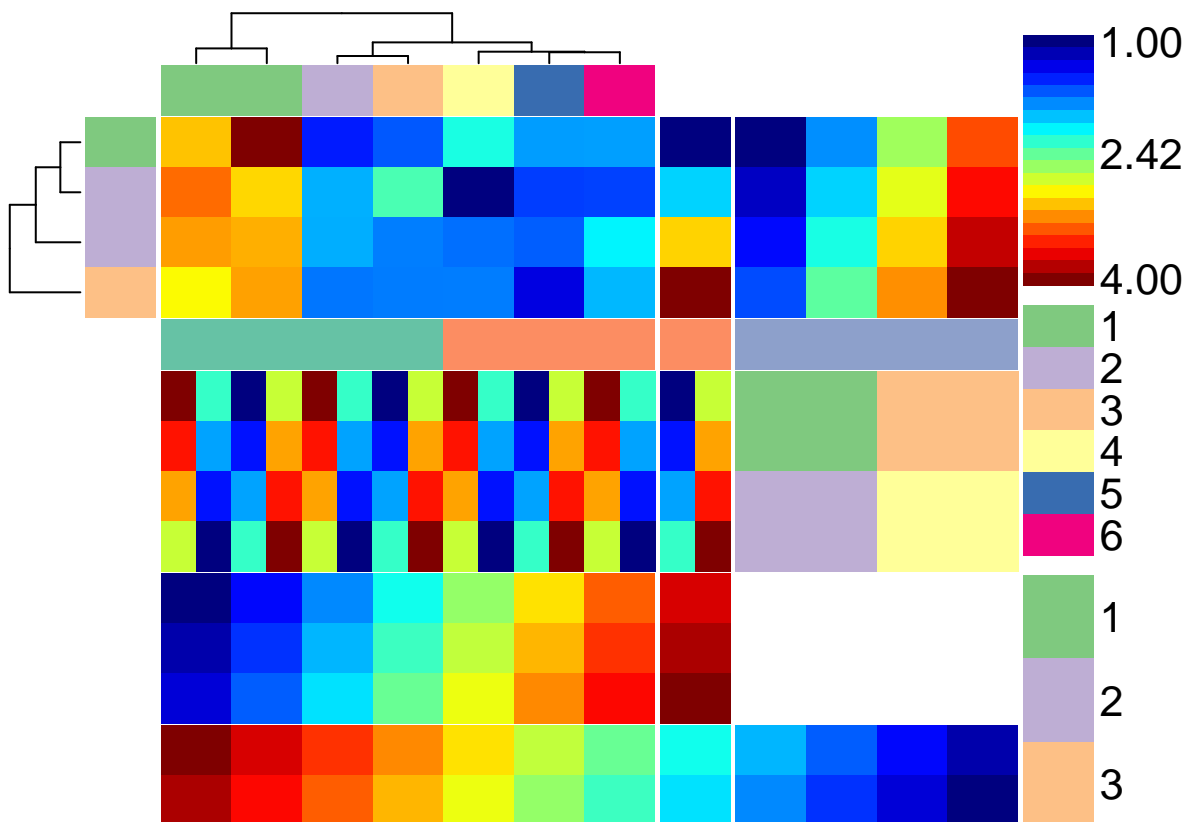
```
a <- a + WLegendV('c2', TopOf('l1', pad=0.1), 'l2')
```

```
## Register WLegendV: l2.
```

```
a <- a + WLegendV('c3', TopOf('l2', pad=0.1), n.text=3)
```

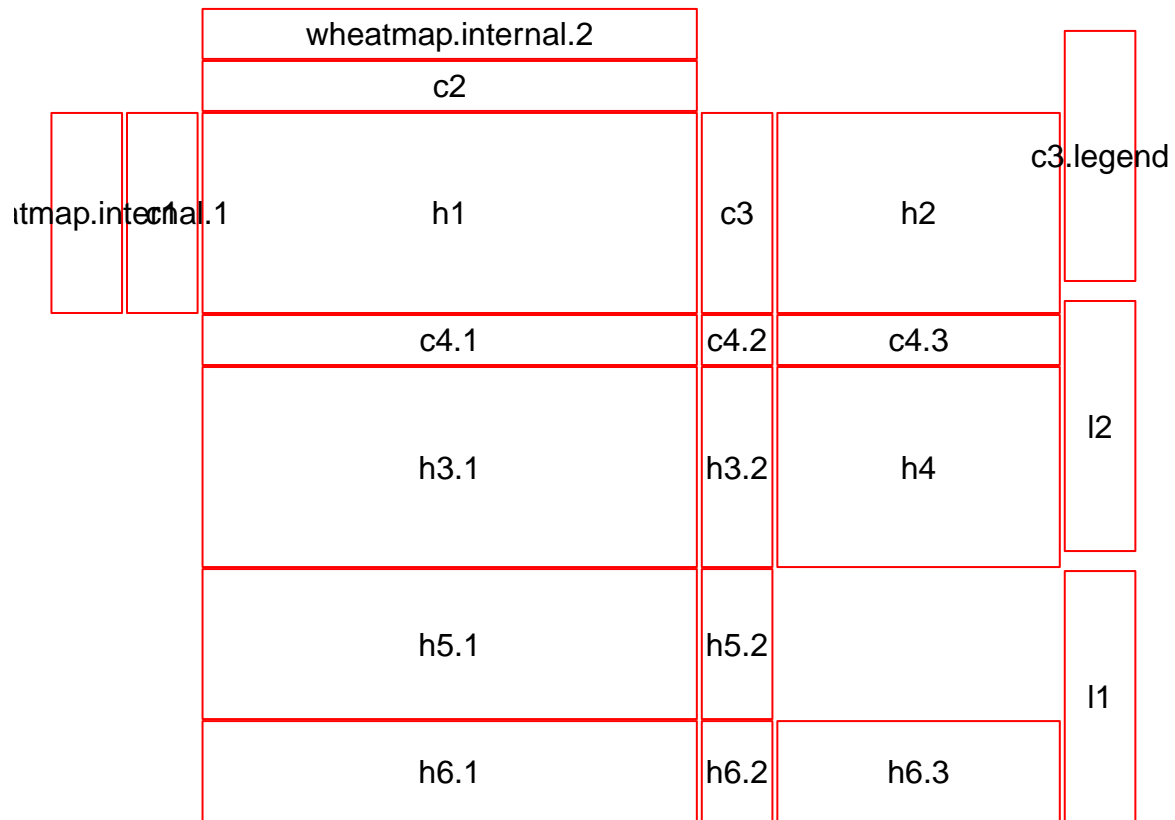
```
## Register WLegendV: c3.legend.
```

```
a
```



We can view the internal layout by the providing the `layout.only=TRUE` option

```
print(a, layout.only=TRUE)
```



Wheatmap automatically de-cluttered the labels when there are too many. Below is an example of too many labels:

```
load_all('~tools/wheatmap/wheatmap/')
```

```
## Loading wheatmap
```

```
m <- matrix(1:1000, nrow=100)
rownames(m) <- paste0('row', 1:100)
WHeatmap(m, yticklabels = TRUE)
```

```
## Register WHeatmap: wheatmap.internal.1.
```

