

Using table1 with L^AT_EX and MS Word

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Introduction

A long requested feature has been the ability to use `table1` in `rmarkdown` documents that render to L^AT_EX or `.docx` (i.e. Microsoft[®] Word). Since version 1.4 of `table1`, this is now possible (with some limitations) by converting the output of `table1()` to a `data.frame`, `kableExtra` or `flextable`, using the functions `as.data.frame()`, `tikable()` and `tiflex()` respectively, as these objects can be rendered to L^AT_EX (note: `data.frame` (via `pandoc`) and `flextable` objects can also be rendered to `.docx` format, while, `kableExtra` cannot).

Examples

We demonstrate this using a familiar example from the main vignette. First, we can try the `data.frame` approach:

```
x <- table1(~ age + sex + wt | treat, data=dat)
as.data.frame(x)
```

##		Placebo	Treated	Overall
## 1		(N=52)	(N=94)	(N=146)
## 2	Age (years)			
## 3	Mean (SD)	39.2 (14.2)	40.1 (13.3)	39.8 (13.6)
## 4	Median [Min, Max]	37.5 [18.0, 65.0]	39.5 [18.0, 65.0]	39.0 [18.0, 65.0]
## 5	Sex			
## 6	Female	34 (65.4%)	53 (56.4%)	87 (59.6%)
## 7	Male	18 (34.6%)	41 (43.6%)	59 (40.4%)
## 8	Weight (kg)			
## 9	Mean (SD)	68.1 (16.3)	68.3 (16.7)	68.2 (16.5)
## 10	Median [Min, Max]	66.7 [37.5, 116]	64.9 [40.0, 119]	66.2 [37.5, 119]
## 11	Missing	2 (3.8%)	3 (3.2%)	5 (3.4%)

By default, this does not produce a L^AT_EX table, but the same text output you would see in the R console. If the `printr` package is loaded, however, we do get a L^AT_EX table by default:

```
library(printr, quietly=TRUE)
```

```
## Registered S3 method overwritten by 'printr':
##   method      from
##   knitr_print.data.frame rmarkdown
```

```
as.data.frame(x)
```

	Placebo	Treated	Overall
	(N=52)	(N=94)	(N=146)
Age (years)			
Mean (SD)	39.2 (14.2)	40.1 (13.3)	39.8 (13.6)
Median [Min, Max]	37.5 [18.0, 65.0]	39.5 [18.0, 65.0]	39.0 [18.0, 65.0]
Sex			
Female	34 (65.4%)	53 (56.4%)	87 (59.6%)
Male	18 (34.6%)	41 (43.6%)	59 (40.4%)
Weight (kg)			
Mean (SD)	68.1 (16.3)	68.3 (16.7)	68.2 (16.5)
Median [Min, Max]	66.7 [37.5, 116]	64.9 [40.0, 119]	66.2 [37.5, 119]
Missing	2 (3.8%)	3 (3.2%)	5 (3.4%)

Alternatively, we can use the `knitr::kable()` function:

```
kable(as.data.frame(x), booktabs=TRUE)
```

	Placebo	Treated	Overall
	(N=52)	(N=94)	(N=146)
Age (years)			
Mean (SD)	39.2 (14.2)	40.1 (13.3)	39.8 (13.6)
Median [Min, Max]	37.5 [18.0, 65.0]	39.5 [18.0, 65.0]	39.0 [18.0, 65.0]
Sex			
Female	34 (65.4%)	53 (56.4%)	87 (59.6%)
Male	18 (34.6%)	41 (43.6%)	59 (40.4%)
Weight (kg)			
Mean (SD)	68.1 (16.3)	68.3 (16.7)	68.2 (16.5)
Median [Min, Max]	66.7 [37.5, 116]	64.9 [40.0, 119]	66.2 [37.5, 119]
Missing	2 (3.8%)	3 (3.2%)	5 (3.4%)

The output here is a bit nicer because we have specified the `booktabs` option, but because we are talking about a simple `data.frame`, there is no option to specify formatting (like bold text for variable labels, for instance).

Next, we can try the `tblkable()` function, to produce a `kableExtra` object:

```
tblkable(x)
```

	Placebo (N=52)	Treated (N=94)	Overall (N=146)
Age (years)			
Mean (SD)	39.2 (14.2)	40.1 (13.3)	39.8 (13.6)
Median [Min, Max]	37.5 [18.0, 65.0]	39.5 [18.0, 65.0]	39.0 [18.0, 65.0]
Sex			
Female	34 (65.4%)	53 (56.4%)	87 (59.6%)
Male	18 (34.6%)	41 (43.6%)	59 (40.4%)
Weight (kg)			
Mean (SD)	68.1 (16.3)	68.3 (16.7)	68.2 (16.5)
Median [Min, Max]	66.7 [37.5, 116]	64.9 [40.0, 119]	66.2 [37.5, 119]
Missing	2 (3.8%)	3 (3.2%)	5 (3.4%)

This looks better: it uses the `booktabs` option by default, variable labels and column headers are bold, and the alignment matches the HTML defaults (first column left-aligned, the remainder centered). Additional customizations can be done using function arguments or additional functions from the `kableExtra` package. One important thing to note is that the object is created using the `escape = FALSE` option from the `kable()` function. This has the advantage that HTML or \LaTeX code can be inserted directly into the output, but care must be taken to escape any special symbols manually or else the table won't look as expected, or it might even lead to an error on compilation of the \LaTeX . The one exception is the the percent symbol (“%”) will be escaped internally automatically.

Finally, we can try using the `tiflex()` function to produce a `flextable` object:

```
tiflex(x)
```

```
## Warning: fonts used in 'flextable' are ignored because the 'pdflatex' engine is
## used and not 'xelatex' or 'lualatex'. You can avoid this warning by using the
## 'set_flextable_defaults(fonts_ignore=TRUE)' command or use a compatible engine
## by defining 'latex_engine: xelatex' in the YAML header of the R Markdown
## document.
```

	Placebo (N=52)	Treated (N=94)	Overall (N=146)
Age (years)			
Mean (SD)	39.2 (14.2)	40.1 (13.3)	39.8 (13.6)
Median [Min, Max]	37.5 [18.0, 65.0]	39.5 [18.0, 65.0]	39.0 [18.0, 65.0]
Sex			
Female	34 (65.4%)	53 (56.4%)	87 (59.6%)
Male	18 (34.6%)	41 (43.6%)	59 (40.4%)
Weight (kg)			
Mean (SD)	68.1 (16.3)	68.3 (16.7)	68.2 (16.5)
Median [Min, Max]	66.7 [37.5, 116]	64.9 [40.0, 119]	66.2 [37.5, 119]
Missing	2 (3.8%)	3 (3.2%)	5 (3.4%)

(Note that that `flextable` output, in particular the font, is different depending on whether the `xelatex`,

lualatex or pdflatex engine is used, and flextable emits a warning when pdflatex, the default for rmarkdown documents, is used because xelatex and lualatex gives more font options.)

The output is less attractive in my opinion, and less consistent with the typical look of L^AT_EX tables and documents. It is more spaced out, doesn't have bold labels or line break in the column headers (actually, this is a problem common to both packages, but the `tblkable()` and `tblflex()` functions deal with it differently because flextable will actually include the line breaks in HTML and .docx output, and the overall best approach is unclear), and doesn't use the booktabs package (the thickness of the horizontal rules is different). Also, flextable places the table in a float, whereas kableExtra leaves it inline. I personally would use kableExtra over flextable in a L^AT_EX documents, and in fact I have made this the default output in a L^AT_EX context (i.e., when using rmarkdown with a L^AT_EX output format). But a big advantage of flextable is that it can render to .docx format (i.e. Microsoft Word), which kableExtra cannot, and is the default output in that context.

Nested groups

Nested groups are supported with kableExtra and flextable, but not simple data.frames. Here, one example with kableExtra:

```
x2 <- table1(~ age + wt | treat*sex, data=dat, overall=FALSE)
tblkable(x2)
```

	Placebo		Treated	
	Female (N=34)	Male (N=18)	Female (N=53)	Male (N=41)
Age (years)				
Mean (SD)	40.6 (14.5)	36.6 (13.6)	40.1 (13.4)	40.1 (13.3)
Median [Min, Max]	39.5 [18.0, 65.0]	33.5 [18.0, 64.0]	39.0 [18.0, 65.0]	41.0 [18.0, 65.0]
Weight (kg)				
Mean (SD)	68.8 (14.8)	66.8 (19.3)	65.6 (15.1)	71.5 (18.0)
Median [Min, Max]	67.2 [45.8, 116]	66.6 [37.5, 105]	61.4 [41.9, 103]	68.3 [40.0, 119]
Missing	1 (2.9%)	1 (5.6%)	3 (5.7%)	0 (0%)

Captions and footnotes

Captions and footnotes are supported with both kableExtra and flextable. An example with kableExtra:

```
x <- table1(~ age + sex + wt | treat, data=dat,
  caption="Test caption", footnote="Test footnote")
tblkable(x)
```

Alternatively, the `kableExtra::footnote()` function can be used to add footnotes to the resulting object (this function also does automatic numbering, which may be considered an advantage). Note that when a caption is used, the table is rendered as a float.

Closing remarks

As of version 1.4, it is now possible to use table1 within L^AT_EX documents. There are some limitations on the formatting, however (it looks fine, but not quite the same as the HTML output and there is less flexibility to control it).

Table 4: Test caption

	Placebo (N=52)	Treated (N=94)	Overall (N=146)
Age (years)			
Mean (SD)	39.2 (14.2)	40.1 (13.3)	39.8 (13.6)
Median [Min, Max]	37.5 [18.0, 65.0]	39.5 [18.0, 65.0]	39.0 [18.0, 65.0]
Sex			
Female	34 (65.4%)	53 (56.4%)	87 (59.6%)
Male	18 (34.6%)	41 (43.6%)	59 (40.4%)
Weight (kg)			
Mean (SD)	68.1 (16.3)	68.3 (16.7)	68.2 (16.5)
Median [Min, Max]	66.7 [37.5, 116]	64.9 [40.0, 119]	66.2 [37.5, 119]
Missing	2 (3.8%)	3 (3.2%)	5 (3.4%)
Test footnote			

The actual \LaTeX code generation is handled by an external package (i.e., `knitr`, `kableExtra` or `flextable`). The \LaTeX generated by `kableExtra` and `flextable` is very different, and in my opinion `kableExtra` produces the better result. Both `kableExtra` and `flextable` have an extensive number of functions that can be applied to the converted object in order to alter the appearance of the table but these will not be described here; refer to each package's documentation for the complete details.