`tinytable` (Typst)

Easy, beautiful, and customizable tables in R

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1 Tiny Tables

`tinytable` is a small but powerful `R` package to draw HTML, LaTeX, Word, PDF, Markdown, and Typst tables. The interface is minimalist, but it gives users direct and convenient access to powerful frameworks to create endlessly customizable tables.

Install the latest version from R-Universe or CRAN:

```
install.packages("tinytable",
  repos = c("https://vincentarelbundock.r-universe.dev", "https://cran.r-
project.org")
)
```

This tutorial introduces the main functions of the package. It is also available as a single PDF document.

Load the library and set some global options:

```
library(tinytable)
options(tinytable_tt_digits = 3)
options(tinytable_latex_placement = "H")
```

Draw a first table:

```
x <- mtcars[1:4, 1:5]
tt(x)
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

1.1 Width and height

The `width` arguments indicating what proportion of the line width the table should cover. This argument accepts a number between 0 and 1 to control the whole table width, or a vector of numeric values between 0 and 1, representing each column.

```
tt(x, width = 0.5)
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

```
tt(x, width = 1)
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

We can control individual columns by supplying a vector. In that case, the sum of `width` elements determines the full table width. For example, this table takes 70% of available width, with the first column 3 times as large as the other ones.

```
tt(x, width = c(.3, .1, .1, .1, .1))
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

When the sum of the `width` vector exceeds 1, it is automatically normalized to full-width. This is convenient when we only want to specify column width in relative terms:

```
tt(x, width = c(3, 2, 1, 1, 1))
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

When specifying a table `width`, the text is automatically wrapped to appropriate size:

```
lorem <- data.frame(
  Lorem = "Sed ut perspiciatis unde omnis iste natus error sit voluptatem
accusantium doloremque laudantium, totam rem aperiam, eaque ipsa quae ab illo
inventore veritatis et quasi architecto beatae vitae dicta sunt explicabo.",
  Ipsum = " Nemo enim ipsam voluptatem quia voluptas sit aspernatur aut odit
aut fugit, sed quia consequuntur magni dolores eos."
)

tt(lorem, width = 3 / 4)
```

Lorem	Ipsum
Sed ut perspiciatis unde omnis iste natus error sit voluptatem accusantium doloremque laudantium, totam rem aperiam, eaque ipsa quae ab illo inventore veritatis et quasi architecto beatae vitae dicta sunt explicabo.	Nemo enim ipsam voluptatem quia voluptas sit aspernatur aut odit aut fugit, sed quia consequuntur magni dolores eos.

The `height` argument controls the height of each row in em units:

```
tt(mtcars[1:4, 1:5], height = 3)
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

1.2 Footnotes

The `notes` argument accepts single strings or named lists of strings:

```
n <- "Fusce id ipsum consequat ante pellentesque iaculis eu a ipsum. Mauris id
ex in nulla consectetur aliquam. In nec tempus diam. Aliquam arcu nibh,
```

```
dapibus id ex vestibulum, feugiat consequat erat. Morbi feugiat dapibus
malesuada. Quisque vel ullamcorper felis. Aenean a sem at nisi tempor pretium
sit amet quis lacus."

tt(lorem, notes = n, width = 1)
```

Lorem	Ipsum
Sed ut perspiciatis unde omnis iste natus error sit voluptatem accusantium doloremque laudantium, totam rem aperiam, eaque ipsa quae ab illo inventore veritatis et quasi architecto beatae vitae dicta sunt explicabo.	Nemo enim ipsam voluptatem quia voluptas sit aspernatur aut odit aut fugit, sed quia consequuntur magni dolores eos.

Fusce id ipsum consequat ante pellentesque iaculis eu a ipsum. Mauris id ex in nulla consectetur aliquam. In nec tempus diam. Aliquam arcu nibh, dapibus id ex vestibulum, feugiat consequat erat. Morbi feugiat dapibus malesuada. Quisque vel ullamcorper felis. Aenean a sem at nisi tempor pretium sit amet quis lacus.

When `notes` is a named list, the names are used as identifiers and displayed as superscripts:

```
tt(x, notes = list(a = "Blah.", b = "Blah blah."))
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

[a] Blah.

[b] Blah blah.

We can also add markers in individual cells by providing coordinates:

```
tt(x, notes = list(
  a = list(i = 0:1, j = 1, text = "Blah."),
  b = "Blah blah."
))
```

mpg[a]	cyl	disp	hp	drat
21[a]	6	160	110	3.9

mpg[a]	cyl	disp	hp	drat
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

[a] Blah.

[b] Blah blah.

1.3 Captions and cross-references

In Quarto, one should always specify captions cross-references using chunk options, and should *not* use the `caption` argument. This is because Quarto automatically post-processes tables, and may introduce conflict with the captions inserted by `tinytable`. For example:

```
@tbl-blah shows that...

```{r}
#| label: tbl-blah
#| tbl-cap: "Blah blah blah"
library(tinytable)
tt(mtcars[1:4, 1:4])
```
```

And here is the rendered version of the code chunk above:

Table 1 shows that...

```
library(tinytable)
tt(mtcars[1:4, 1:4])
```

Table 1: Blah blah blah

mpg	cyl	disp	hp
21	6	160	110
21	6	160	110
22.8	4	108	93
21.4	6	258	110

One exception to the injunction above is when rendering a Quarto document to LaTeX using `theme_latex(multipage = TRUE, rowhead = 1)`. In that case, one must *avoid* using the Quarto chunk option, because these options trigger Quarto post-processing that will conflict with the `longtblr` environment used to split long tables across multiple pages.

The alternative is to use to refer to tables using standard LaTeX syntax: `\ref{tbl-ex-multipage}`. Then, use the `caption` argument in `tt()` to specify both the label and the caption:

```
tt(iris, caption = "Example table.\\label{tbl-ex-multipage}") |>
  theme_latex(multipage = TRUE, rowhead = 1)
```

For standalone tables in any format (i.e., outside Quarto), you can use the `caption` argument like so:

```
tt(x, caption = "Blah blah.\\label{tbl-blah}")
```

1.4 Output formats

`tinytable` can produce tables in HTML, Word, Markdown, LaTeX, Typst, PDF, or PNG format. An appropriate output format for printing is automatically selected based on (1) whether the function is called interactively, (2) is called within RStudio, and (3) the output format of the Rmarkdown or Quarto document, if applicable. Alternatively, users can specify the print format in `print()` or by setting a global option:

```
tt(x) |> print("markdown")
tt(x) |> print("html")
tt(x) |> print("latex")

options(tinytable_print_output = "markdown")
```

With the `save_tt()` function, users can also save tables directly to PNG (images), PDF or Word documents, and to any of the basic formats. All we need to do is supply a valid file name with the appropriate extension (ex: `.png`, `.html`, `.pdf`, etc.):

```
tt(x) |> save_tt("path/to/file.png")
tt(x) |> save_tt("path/to/file.pdf")
tt(x) |> save_tt("path/to/file.docx")
tt(x) |> save_tt("path/to/file.html")
tt(x) |> save_tt("path/to/file.tex")
tt(x) |> save_tt("path/to/file.md")
```

`save_tt()` can also return a string with the table in it, for further processing in R. In the first case, the table is printed to console with `cat()`. In the second case, it returns as a single string as an R object.

```
tt(mtcars[1:10, 1:5]) |>
  group_tt(
    i = list(
      "Hello" = 3,
      "World" = 8
```

```
    ),
    j = list(
      "Foo" = 2:3,
      "Bar" = 4:5
    )
  ) |>
  print("markdown")
```

```
+------+-----+------+-----+------+
|      | Foo        | Bar        |
+------+-----+------+-----+------+
| mpg  | cyl        | hp  | drat |
+======+=====+======+=====+======+
| 21   | 6   | 160  | 110 | 3.9  |
+------+-----+------+-----+------+
| 21   | 6   | 160  | 110 | 3.9  |
+------+-----+------+-----+------+
| Hello                          |
+------+-----+------+-----+------+
| 22.8 | 4   | 108  | 93  | 3.85 |
+------+-----+------+-----+------+
| 21.4 | 6   | 258  | 110 | 3.08 |
+------+-----+------+-----+------+
| 18.7 | 8   | 360  | 175 | 3.15 |
+------+-----+------+-----+------+
| 18.1 | 6   | 225  | 105 | 2.76 |
+------+-----+------+-----+------+
| 14.3 | 8   | 360  | 245 | 3.21 |
+------+-----+------+-----+------+
| World                          |
+------+-----+------+-----+------+
| 24.4 | 4   | 147  | 62  | 3.69 |
+------+-----+------+-----+------+
| 22.8 | 4   | 141  | 95  | 3.92 |
+------+-----+------+-----+------+
| 19.2 | 6   | 168  | 123 | 3.92 |
+------+-----+------+-----+------+
```

```
tt(mtcars[1:10, 1:5]) |>
  group_tt(
    i = list(
      "Hello" = 3,
      "World" = 8
    ),
    j = list(
      "Foo" = 2:3,
```

```
    "Bar" = 4:5
  )
) |>
save_tt("markdown")
```

```
[1] "+------+-----+------+-----+------+\n|      | Foo        | Bar        |
\n+------+-----+------+-----+------+\n| mpg  | cyl        | hp  | drat |
\n+======+=====+======+=====+======+\n| 21   | 6   | 160  | 110 | 3.9  |
\n+------+-----+------+-----+------+\n| 21   | 6   | 160  | 110 | 3.9  |
\n+------+-----+------+-----+------+\n| Hello                         |
\n+------+-----+------+-----+------+\n| 22.8 | 4   | 108  | 93  | 3.85 |
\n+------+-----+------+-----+------+\n| 21.4 | 6   | 258  | 110 | 3.08 |
\n+------+-----+------+-----+------+\n| 18.7 | 8   | 360  | 175 | 3.15 |
\n+------+-----+------+-----+------+\n| 18.1 | 6   | 225  | 105 | 2.76 |
\n+------+-----+------+-----+------+\n| 14.3 | 8   | 360  | 245 | 3.21 |
\n+------+-----+------+-----+------+\n| World                         |
\n+------+-----+------+-----+------+\n| 24.4 | 4   | 147  | 62  | 3.69 |
\n+------+-----+------+-----+------+\n| 22.8 | 4   | 141  | 95  | 3.92 |
\n+------+-----+------+-----+------+\n| 19.2 | 6   | 168  | 123 | 3.92 |
\n+------+-----+------+-----+------+"
```

1.5 Combination and exploration

Tables can be explored, modified, and combined using many of the usual base R functions:

```
a <- tt(mtcars[1:2, 1:2])
a
```

mpg	cyl
21	6
21	6

```
dim(a)
```

```
[1] 2 2
```

```
ncol(a)
```

```
[1] 2
```

```
nrow(a)
```

```
[1] 2
```

```
names(a)
```

```
[1] "mpg" "cyl"
```

Tables can be combined with the usual `rbind()` function:

```
a <- tt(mtcars[1:3, 1:2], caption = "Combine two tiny tables.")
b <- tt(mtcars[4:5, 8:10])

rbind(a, b)
```

mpg	cyl	vs	am	gear
21	6	NA	NA	NA
21	6	NA	NA	NA
22.8	4	NA	NA	NA
NA	NA	vs	am	gear
NA	NA	1	0	3
NA	NA	0	0	3

```
rbind(a, b) |> format_tt(replace = "")
```

mpg	cyl	vs	am	gear
21	6			
21	6			
22.8	4			
		vs	am	gear
		1	0	3
		0	0	3

The `rbind2()` S4 method is slightly more flexible than `rbind()`, as it supports arguments `headers` and `use_names`.

Omit y header:

```
rbind2(a, b, headers = FALSE)
```

mpg	cyl	vs	am	gear
21	6	NA	NA	NA
21	6	NA	NA	NA
22.8	4	NA	NA	NA
NA	NA	1	0	3
NA	NA	0	0	3

Bind tables by position rather than column names:

```
rbind2(a, b, use_names = FALSE)
```

mpg	cyl	gear
21	6	NA
21	6	NA
22.8	4	NA
vs	am	gear
1	0	3
0	0	3

1.6 Select columns

The `subset()` function from base `R` can be used to select columns from a `tinytable`. This is especially useful when applying conditional styling based on column values, and then removing them. For example, if we have a table with 6 rows and three `Species`:

```
dat <- do.call(rbind, by(iris, ~Species, head, n = 2))
dat
```

```
             Sepal.Length Sepal.Width Petal.Length Petal.Width    Species
setosa.1              5.1         3.5          1.4         0.2     setosa
setosa.2              4.9         3.0          1.4         0.2     setosa
versicolor.51         7.0         3.2          4.7         1.4 versicolor
versicolor.52         6.4         3.2          4.5         1.5 versicolor
virginica.101         6.3         3.3          6.0         2.5  virginica
virginica.102         5.8         2.7          5.1         1.9  virginica
```

We highlight the `versicolor` rows in pink and remove the `Species` column:

```
tt(dat) |>
  style_tt(Species == "versicolor", background = "pink") |>
  subset(select = -Species)
```

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width
5.1	3.5	1.4	0.2
4.9	3	1.4	0.2
7	3.2	4.7	1.4
6.4	3.2	4.5	1.5
6.3	3.3	6	2.5
5.8	2.7	5.1	1.9

Or

```
tt(dat) |>
  style_tt(Species == "versicolor", background = "pink") |>
  subset(select = c(Sepal.Length, Sepal.Width))
```

Sepal.Length	Sepal.Width
5.1	3.5
4.9	3
7	3.2
6.4	3.2
6.3	3.3
5.8	2.7

1.7 Rename columns

As noted above, `tinytable` tries to be standards-compliant, by defining methods for many base `R` functions. The benefit of this approach is that instead of having to learn a `tinytable`-specific syntax, users can rename columns using all the tools they already know:

```
a <- tt(mtcars[1:2, 1:2])
names(a) <- c("a", "b")
a
```

a	b
21	6

a	b
21	6

In a pipe-based workflow, we can use the `setNames()` function from base `R`:

```
mtcars[1:2, 1:2] |>
  tt() |>
  setNames(c("a", "b"))
```

a	b
21	6
21	6

2 Formatting

```
library(tinytable)
options(tinytable_tt_digits = 3)
options(tinytable_latex_placement = "H")
x <- mtcars[1:4, 1:5]
```

2.1 Numbers, dates, strings, etc.

The `tt()` function is minimalist; it's inteded purpose is simply to draw nice tables. Users who want to format numbers, dates, strings, and other variables in different ways should process their data *before* supplying it to the `tt()` table-drawing function. To do so, we can use the `format_tt()` function supplied by the `tinytable`.

In a very simple case—such as printing 2 significant digits of all numeric variables—we can use the `digits` argument of `tt()`:

```
dat <- data.frame(
  w = c(143002.2092, 201399.181, 100188.3883),
  x = c(1.43402, 201.399, 0.134588),
  y = as.Date(sample(1:1000, 3), origin = "1970-01-01"),
  z = c(TRUE, TRUE, FALSE)
)

tt(dat, digits = 2)
```

w	x	y	z
143002	1.43	1970-06-04	TRUE
201399	201.4	1971-07-12	TRUE

w	x	y	z
100188	0.13	1970-03-19	FALSE

We can get more fine-grained control over formatting by calling `format_tt()` after `tt()`, optionally by specifying the columns to format with `j`:

```
tt(dat) |>
  format_tt(
    j = 2:4,
    digits = 1,
    date = "%B %d %Y",
    bool = tolower
  ) |>
  format_tt(
    j = 1,
    digits = 2,
    num_mark_big = " ",
    num_mark_dec = ",",
    num_zero = TRUE,
    num_fmt = "decimal"
  )
```

w	x	y	z
143 002,21	1.4	June 04 1970	true
201 399,18	201.4	July 12 1971	true
100 188,39	0.1	March 19 1970	false

We can use a regular expression in `j` to select columns, and the `?sprintf` function to format strings, numbers, and to do string interpolation (similar to the `glue` package, but using Base `R`):

```
dat <- data.frame(
  a = c("Burger", "Halloumi", "Tofu", "Beans"),
  b = c(1.43202, 201.399, 0.146188, 0.0031),
  c = c(98938272783457, 7288839482, 29111727, 93945)
)
tt(dat) |>
  format_tt(j = "a", sprintf = "Food: %s") |>
  format_tt(j = 2, digits = 1) |>
  format_tt(j = "c", digits = 2, num_suffix = TRUE)
```

a	b	c
Food: Burger	1.432	99T

a	b	c
Food: Halloumi	201.399	7.3B
Food: Tofu	0.146	29M
Food: Beans	0.003	94K

Finally, if you like the `format_tt()` interface, you can use it directly with numbers, vectors, or data frames:

```
format_tt(pi, digits = 1)
```

```
[1] "3"
```

```
format_tt(dat, digits = 1, num_suffix = TRUE)
```

```
         a     b   c
1   Burger     1 99T
2 Halloumi   201  7B
3     Tofu   0.1 29M
4    Beans 0.003 94K
```

2.2 Significant digits and decimals

By default, `format_tt()` formats numbers to ensure that the smallest value in a vector (column) has at least a certain number of significant digits. For example,

```
k <- data.frame(x = c(0.000123456789, 12.4356789))
tt(k, digits = 2)
```

x
0.00012
12.43568

We can alter this behavior to ensure to round significant digits on a per-cell basis, using the `num_fmt` argument in `format_tt()`:

```
tt(k) |> format_tt(digits = 2, num_fmt = "significant_cell")
```

x
0.00012

x
12

The numeric formatting options in `format_tt()` can also be controlled using global options:

```
options("tinytable_tt_digits" = 2)
options("tinytable_format_num_fmt" = "significant_cell")
tt(k)
```

x
0.00012
12

2.3 Math

To insert LaTeX-style mathematical expressions in a `tinytable`, we enclose the expression in dollar signs: `$...$`. Note that you must double backslashes in mathematical expressions in R strings.

In LaTeX, expression enclosed between `$$` will automatically rendered as a mathematical expression.

In HTML, users must first load the MathJax JavaScript library to render math. This can be done in two ways. First, one can use a global option. This will insert MathJax scripts alongside every table, which is convenient, but could enter in conflict with other scripts if the user (or notebook) has already inserted MathJax code:

```
options(tinytable_html_mathjax = TRUE)
```

Alternatively, users can load MathJax explicitly in their HTML file. In a Quarto notebook, this can be done by using a code chunk like this:

```
```{=html}
<script id="MathJax-script" async src="https://cdn.jsdelivr.net/npm/mathjax@3/
es5/tex-mml-chtml.js"></script>
<script>
MathJax = {
  tex: {
    inlineMath: [['$', '$'], ['\\(', '\\)']]
  },
  svg: {
    fontCache: 'global'
  }
};
```
```

```
</script>
```

Then, we can do:

```
dat <- data.frame(Math = c(
  "$x^2 + y^2 = z^2$",
  "$\\frac{1}{2}$"
))
tt(dat) |> style_tt(j = 1, align = "c")
```

To avoid inserting `$...$` in every cell manually, we can use the `math` argument of `format_tt()`:

```
options(tinytable_html_mathjax = TRUE)

dat <- data.frame("y^2 = e^x" = c(-2, -pi), check.names = FALSE)

tt(dat, digits = 3) |> format_tt(math = TRUE)
```

$y^2 = e^x$
-2
-3.14

Note that math rendering may not work automatically in Rmarkdown document. See the notebooks vignette for advice on Rmarkdown documents.

2.4 Replacement

Missing values can be replaced by a custom string using the `replace` argument:

```
tab <- data.frame(a = c(NA, 1, 2), b = c(3, NA, 5))

tt(tab)
```

a	b
NA	3
1	NA
2	5

```
tt(tab) |> format_tt(replace = "-")
```

a	b
-	3
1	-
2	5

Warning: When using `quarto=TRUE`, the dash may be interpreted as the start of a list.

We can also specify multiple value replacements at once using a named list of vectors:

```
tmp <- data.frame(x = 1:5, y = c(pi, NA, NaN, -Inf, Inf))
dict <- list("-" = c(NA, NaN), "-∞" = -Inf, "∞" = Inf)
tt(tmp) |> format_tt(replace = dict, digits = 2)
```

x	y
1	3.1
2	-
3	-
4	-∞
5	∞

2.5 Escape special characters

LaTeX and HTML use special characters to indicate strings which should be interpreted rather than displayed as text. For example, including underscores or dollar signs in LaTeX can cause compilation errors in some documents. To display those special characters, we need to substitute or escape them with backslashes, depending on the output format. The `escape` argument of `format_tt()` can be used to do this automatically:

```
dat <- data.frame(
  "LaTeX" = c("Dollars $", "Percent %", "Underscore _", "Backslash \\"),
  "HTML" = c("<br>", "<sup>4</sup>", "<emph>blah</emph>", "&amp;"),
  "Typst" = c("Dollars $", "Percent %", "Underscore _", "Backslash \\")
)

tt(dat) |> format_tt(escape = TRUE)
```

LaTeX	HTML	Typst
Dollars $	 	Dollars $
Percent %	⁴	Percent %
Underscore _	<emph>blah</emph>	Underscore _

LaTeX	HTML	Typst
Backslash \	&	Backslash \

When applied to a `tt()` table, `format_tt()` will determine the type of escaping to do automatically. When applied to a string or vector, we must specify the type of escaping to apply:

```
format_tt("_ Dollars $", escape = "latex")
```

```
[1] "\\_ Dollars \\$"
```

2.6 Line breaks

LaTeX, Typst, and HTML use different character sequences to indicate line breaks. We can create a single table that works in all three formats by using the `linebreak` argument of `format_tt()`. The idea is to choose one specific character sequence to represent line breaks, and to supply it to the `linebreak` argument.

In this example, we use `<br>` to represent line breaks in our data. This is the standard approach in HTML, and we rely on `format_tt()` substitute it to an appropriate string in other formats:

```
d <- data.frame(Text = "First line<br>Second line")
tt(d, width = .4) |> format_tt(linebreak = "<br>")
```

Text
First line Second line

The `linebreak` argument automatically converts your specified string to:

- HTML: `<br>`
- LaTeX: `\\`
- Typst: `\`
- Markdown: No conversion (preserves original string)

2.7 Custom functions

On top of the built-in features of `format_tt`, a custom formatting function can be specified via the `fn` argument. The `fn` argument takes a function that accepts a single vector and returns a string (or something that coerces to a string like a number).

```
tt(x) |>
  format_tt(j = "mpg", fn = function(x) paste(x, "mi/gal")) |>
  format_tt(j = "drat", fn = \(x) signif(x, 2))
```

mpg	cyl	disp	hp	drat
21 mi/gal	6	160	110	3.9
21 mi/gal	6	160	110	3.9
22.8 mi/gal	4	108	93	3.8
21.4 mi/gal	6	258	110	3.1

For example, the `scales` package which is used internally by `ggplot2` provides a bunch of useful tools for formatting (e.g. dates, numbers, percents, logs, currencies, etc.). The `label_*()` functions can be passed to the `fn` argument.

Note that we call `format_tt(escape = TRUE)` at the end of the pipeline because the column names and cells include characters that need to be escaped in LaTeX: `_`, `%`, and `$`. This last call is superfluous in HTML.

```
thumbdrives <- data.frame(
  date_lookup = as.Date(c("2024-01-15", "2024-01-18", "2024-01-14",
"2024-01-16")),
  price = c(18.49, 19.99, 24.99, 24.99),
  price_rank = c(1, 2, 3, 3),
  memory = c(16e9, 12e9, 10e9, 8e9),
  speed_benchmark = c(0.6, 0.73, 0.82, 0.99)
)

tt(thumbdrives) |>
  format_tt(j = 1, fn = scales::label_date("%B %d %Y")) |>
  format_tt(j = 2, fn = scales::label_currency()) |>
  format_tt(j = 3, fn = scales::label_ordinal()) |>
  format_tt(j = 4, fn = scales::label_bytes()) |>
  format_tt(j = 5, fn = scales::label_percent()) |>
  format_tt(escape = TRUE)
```

date_lookup	price	price_rank	memory	speed_benchmark
January 15 2024	$18.49	1st	16 GB	60%
January 18 2024	$19.99	2nd	12 GB	73%
January 14 2024	$24.99	3rd	10 GB	82%
January 16 2024	$24.99	3rd	8 GB	99%

2.8 Captions, notes, groups, and column names

The `format_tt()` function can also be used to format captions, notes, and column names.

```
tab <- data.frame(
  "A_B" = rnorm(5),
  "B_C" = rnorm(5),
  "C_D" = rnorm(5))

tt(tab, digits = 2, notes = "_Source_: Simulated data.") |>
  group_tt(i = list("Down" = 1, "Up" = 3)) |>
  format_tt("colnames", fn = \(x) sub("_", " / ", x)) |>
  format_tt("notes", markdown = TRUE) |>
  format_tt("groupi", replace = list("↓" = "Down", "↑" = "Up"))
```

A / B	B / C	C / D
↓		
1.5	0.429	1.292
−0.58	0.219	−0.976
↑		
−0.97	−1.599	0.392
−0.78	−0.674	−0.554
−0.16	−0.098	−0.035

Source: Simulated data.

3 Style

The main styling function for the `tinytable` package is `style_tt()`. Via this function, you can access three main interfaces to customize tables:

1. A general interface to frequently used style choices which works for both HTML and LaTeX (PDF): colors, font style and size, row and column spans, etc. This is accessed through several distinct arguments in the `style_tt()` function, such as `italic`, `color`, etc.
2. A specialized interface which allows users to use the powerful `tabularray` package to customize LaTeX tables. This is accessed by passing `tabularray` settings as strings to the `inner` and `outer` arguments of `theme_latex()`.
3. A specialized interface which allows users to use the powerful `Bootstrap` framework to customize HTML tables. This is accessed by passing CSS declarations and rules to the `bootstrap_css` and `bootstrap_css_rule` arguments of `style_tt()`.

These functions can be used to customize rows, columns, or individual cells. They control many features, including:

- Text color
- Background color
- Widths

- Heights
- Alignment
- Text Wrapping
- Column and Row Spacing
- Cell Merging
- Multi-row or column spans
- Border Styling
- Font Styling: size, underline, italic, bold, strikethrough, etc.
- Header Customization

The `style_*()` functions can modify individual cells, or entire columns and rows. The portion of the table that is styled is determined by the `i` (rows) and `j` (columns) arguments.

```
library(tinytable)
options(tinytable_tt_digits = 3)
options(tinytable_latex_placement = "H")
x <- mtcars[1:4, 1:5]
```

3.1 Cells, rows, columns

To style individual cells, we use the `style_cell()` function. The first two arguments—`i` and `j`—identify the cells of interest, by row and column numbers respectively. To style a cell in the 2nd row and 3rd column, we can do:

```
tt(x) |>
  style_tt(
    i = 2,
    j = 3,
    background = "black",
    color = "white"
  )
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

The `i` and `j` accept vectors of integers to modify several cells at once:

```
tt(x) |>
  style_tt(
    i = 2:3,
```

```
    j = c(1, 3, 4),
    italic = TRUE,
    color = "orange"
  )
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	*160*	*110*	3.9
22.8	4	*108*	*93*	3.85
21.4	6	258	110	3.08

We can style all cells in a table by omitting both the `i` and `j` arguments:

```
tt(x) |> style_tt(color = "orange")
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

We can style entire rows by omitting the `j` argument:

```
tt(x) |> style_tt(i = 1:2, color = "orange")
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

We can style entire columns by omitting the `i` argument:

```
tt(x) |> style_tt(j = c(2, 4), bold = TRUE)
```

mpg	**cyl**	disp	**hp**	drat
21	**6**	160	**110**	3.9

mpg	**cyl**	disp	**hp**	drat
21	**6**	160	**110**	3.9
22.8	**4**	108	**93**	3.85
21.4	**6**	258	**110**	3.08

The `j` argument accepts integer vectors, character vectors, but also a string with a Perl-style regular expression, which makes it easier to select columns by name:

```
tt(x) |> style_tt(j = c("mpg", "drat"), color = "orange")
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

```
tt(x) |> style_tt(j = "mpg|drat", color = "orange")
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

Here we use a "negative lookahead" to exclude certain columns:

```
tt(x) |> style_tt(j = "^(?!drat|mpg)", color = "orange")
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

Of course, we can also call the `style_tt()` function several times to apply different styles to different parts of the table:

```
tt(x) |>
  style_tt(i = 1, j = 1:2, color = "orange") |>
  style_tt(i = 1, j = 3:4, color = "green")
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

The `i` argument also accepts unquoted expressions for non-standard evaluation. This allows us to style rows based on data conditions:

```
tt(x) |>
  style_tt(i = mpg > 21, background = "lightblue", bold = TRUE)
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	**4**	**108**	**93**	**3.85**
21.4	**6**	**258**	**110**	**3.08**

There is also a `groupi` object with indices that can be manipulated as an unquoted numeric expression.

```
tt(head(mtcars, 10)) |>
    group_tt(i = list("Hello" = 3, "World" = 5)) |>
    group_tt(j = list("Cyl" = 1:3, "Disp" = 4:6)) |>
    style_tt(groupi, background = "pink", align = "c") |>
    style_tt(groupi + 1, color = "white", background = "teal")
```

	Cyl			Disp						
mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
21	6	160	110	3.9	2.62	16.5	0	1	4	4
21	6	160	110	3.9	2.88	17	0	1	4	4
Hello										
22.8	4	108	93	3.85	2.32	18.6	1	1	4	1

	Cyl			Disp						
mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
21.4	6	258	110	3.08	3.21	19.4	1	0	3	1
World										
18.7	8	360	175	3.15	3.44	17	0	0	3	2
18.1	6	225	105	2.76	3.46	20.2	1	0	3	1
14.3	8	360	245	3.21	3.57	15.8	0	0	3	4
24.4	4	147	62	3.69	3.19	20	1	0	4	2
22.8	4	141	95	3.92	3.15	22.9	1	0	4	2
19.2	6	168	123	3.92	3.44	18.3	1	0	4	4

3.2 Colors

The `color` and `background` arguments in the `style_tt()` function are used for specifying the text color and the background color for cells of a table created by the `tt()` function. This argument plays a crucial role in enhancing the visual appeal and readability of the table, whether it's rendered in LaTeX or HTML format. The way we specify colors differs slightly between the two formats:

For HTML Output:

- Hex Codes: You can specify colors using hexadecimal codes, which consist of a # followed by 6 characters (e.g., `#CC79A7`). This allows for a wide range of colors.
- Keywords: There's also the option to use color keywords for convenience. The supported keywords are basic color names like `black`, `red`, `blue`, etc.

For LaTeX Output:

- Hexadecimal Codes: Similar to HTML, you can use hexadecimal codes.
- Keywords: LaTeX supports a different set of color keywords, which include standard colors like `black`, `red`, `blue`, as well as additional ones like `cyan`, `darkgray`, `lightgray`, etc.
- Color Blending: An advanced feature in LaTeX is color blending, which can be achieved using the `xcolor` package. You can blend colors by specifying ratios (e.g., `white!80!blue` or `green!20!red`).
- Luminance Levels: The `ninecolors` package in LaTeX offers colors with predefined luminance levels, allowing for more nuanced color choices (e.g., "azure4", "magenta8").

Note that the keywords used in LaTeX and HTML are slightly different.

```
tt(x) |> style_tt(i = 1:4, j = 1, color = "#FF5733")
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

Note that when using Hex codes in a LaTeX table, we need extra declarations in the LaTeX preamble. See `?tt` for details.

3.3 Alignment

To align columns, we use a single character, or a string where each letter represents a column:

```
dat <- data.frame(
  a = c("a", "aaa", "aaaaa"),
  b = c("b", "bbb", "bbbbb"),
  c = c("c", "ccc", "ccccc")
)

tt(dat) |> style_tt(j = 1:3, align = "c")
```

a	b	c
a	b	c
aaa	bbb	ccc
aaaaa	bbbbb	ccccc

```
tt(dat) |> style_tt(j = 1:3, align = "lcr")
```

a	b	c
a	b	c
aaa	bbb	ccc
aaaaa	bbbbb	ccccc

In LaTeX documents (only), we can use decimal-alignment:

```
z <- data.frame(pi = c(pi * 100, pi * 1000, pi * 10000, pi * 100000))
tt(z) |>
  format_tt(j = 1, digits = 8, num_fmt = "significant_cell") |>
  style_tt(j = 1, align = "d")
```

pi
314.15927
3141.5927
31415.927
314159.27

3.4 Font size

The font size is specified in em units.

```
tt(x) |> style_tt(i = 1:4, j = "mpg|hp|qsec", fontsize = 1.5)
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

3.5 Spanning cells (merging cells)

Sometimes, it can be useful to make a cell stretch across multiple colums or rows, for example when we want to insert a label. To achieve this, we can use the `colspan` argument. Here, we make the 2nd cell of the 2nd row stretch across three columns and two rows:

```
tt(x) |> style_tt(
  i = 2, j = 2,
  colspan = 3,
  rowspan = 2,
  align = "c",
  alignv = "m",
  color = "white",
  background = "black",
  bold = TRUE
)
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	**6**			3.9
22.8				3.85

mpg	cyl	disp	hp	drat
21.4	6	258	110	3.08

Here is the original table for comparison:

```
tt(x)
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

Spanning cells can be particularly useful when we want to suppress redundant labels:

```
tab <- aggregate(mpg ~ cyl + am, FUN = mean, data = mtcars)
tab <- tab[order(tab$cyl, tab$am), ]
tab
```

```
  cyl am      mpg
1   4  0 22.90000
4   4  1 28.07500
2   6  0 19.12500
5   6  1 20.56667
3   8  0 15.05000
6   8  1 15.40000
```

```
tt(tab, digits = 2) |>
  style_tt(i = c(1, 3, 5), j = 1, rowspan = 2, alignv = "t")
```

cyl	am	mpg
4	0	23
	1	28
6	0	19
	1	21
8	0	15
	1	15

The `rowspan` feature is also useful to create multi-row labels. For example, in this table there is a linebreak, but all the text fits in a single cell:

```
tab <- data.frame(Letters = c("A<br>B", ""), Numbers = c("First", "Second"))

tt(tab) |>
  theme_html(class = "table-bordered")
```

Letters	Numbers
AB	First
	Second

Now, we use `colspan` to ensure that that cells in the first column take up less space and are combined into one:

```
tt(tab) |>
  theme_html(class = "table-bordered") |>
  style_tt(1, 1, rowspan = 2)
```

Letters	Numbers
AB	First
	Second

We can combine several spans to create complex tables like this one:

```
df <- structure(list(
  Col1 = c("Col Header", "Item 0", "Item 1", "Item 2", "Total"),
  Col2 = c("Span 1", "X", "xx", "xx", "xxxx"),
  Col2.1 = c("Span 1", "Y", "xx", "xx", "xxxx"),
  Col2.2 = c("Span 2", "X", "xx", "xx", "xxxx"),
  Col2.3 = c("Span 2", "Y", "xx", "xx", "xxxx")),
  class = "data.frame", row.names = c(NA, -5L))
df |>
    setNames(NULL) |>
    tt() |>
    style_tt(1, 1, rowspan = 2, bold = TRUE) |>
    style_tt(1, c(2, 4), colspan = 2, bold = TRUE) |>
    style_tt(5, c(2, 4), colspan = 2) |>
    theme_grid()
```

Col Header	**Span 1**		**Span 2**	
	X	Y	X	Y

Item 1	xx	xx	xx	xx
Item 2	xx	xx	xx	xx
Total	xxxx		xxxx	

3.6 Headers

The header can be omitted from the table by using the `colnames` argument.

```
tt(x, colnames = FALSE)
```

21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

The first is row 0, and higher level headers (ex: column spanning labels) have negative indices like −1. They can be styled as expected:

```
tt(x) |> style_tt(i = 0, color = "white", background = "black")
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

When styling columns without specifying `i`, the headers are styled in accordance with the rest of the column:

```
tt(x) |> style_tt(j = 2:3, color = "white", background = "black")
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

3.7 Conditional styling

We can use the standard `which` function from Base `R` to create indices and apply conditional stying on rows. And we can use a regular expression in `j` to apply conditional styling on columns:

```
k <- mtcars[1:10, c("mpg", "am", "vs")]

tt(k) |>
  style_tt(
    i = which(k$am == k$vs),
    background = "teal",
    color = "white"
  )
```

mpg	am	vs
21	1	0
21	1	0
22.8	1	1
21.4	0	1
18.7	0	0
18.1	0	1
14.3	0	0
24.4	0	1
22.8	0	1
19.2	0	1

We can also use non-standard evaluation to apply conditional styling directly with unquoted expressions:

```
tt(k) |>
  style_tt(i = mpg > 22, background = "lightgreen", bold = TRUE)
```

mpg	am	vs
21	1	0
21	1	0
22.8	**1**	**1**
21.4	0	1
18.7	0	0

mpg	am	vs
18.1	0	1
14.3	0	0
24.4	**0**	**1**
22.8	**0**	**1**
19.2	0	1

Users can also supply a logical matrix of the same size as x to indicate which cell should be styled. For example, we can change the colors of certain entries in a correlation matrix as follows:

```
cormat <- data.frame(cor(mtcars[1:5]))
tt(cormat, digits = 2) |>
  style_tt(i = abs(cormat) > .8, background = "black", color = "white")
```

mpg	cyl	disp	hp	drat
1	−0.85	−0.85	−0.78	0.68
−0.85	1	0.9	0.83	−0.7
−0.85	0.9	1	0.79	−0.71
−0.78	0.83	0.79	1	−0.45
0.68	−0.7	−0.71	−0.45	1

3.8 Vectorized styling (heatmaps)

The `color`, `background`, and `fontsize` arguments are vectorized. This allows easy specification of different colors in a single call:

```
tt(x) |>
  style_tt(
    i = 1:4,
    color = c("red", "blue", "green", "orange")
  )
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

When using a single value for a vectorized argument, it gets applied to all values:

```
tt(x) |>
  style_tt(
    j = 2:3,
    color = c("orange", "green"),
    background = "black"
  )
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

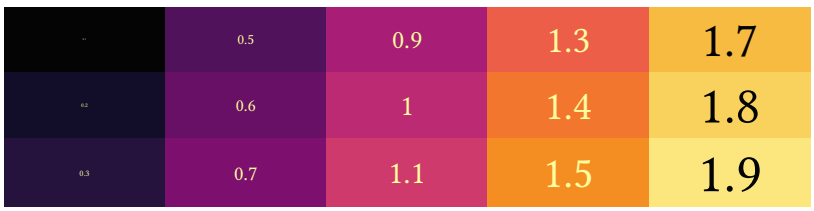
We can also produce more complex heatmap-like tables to illustrate different font sizes in em units:

```
# font sizes
fs <- seq(.1, 2, length.out = 20)

# headless table
k <- data.frame(matrix(fs, ncol = 5))

# colors
bg <- hcl.colors(20, "Inferno")
fg <- ifelse(as.matrix(k) < 1.7, tail(bg, 1), head(bg, 1))

# table
tt(k, width = .7, theme = "empty", colnames = FALSE) |>
  style_tt(j = 1:5, align = "ccccc", alignv = "m") |>
  style_tt(
    i = 1:4,
    j = 1:5,
    color = fg,
    background = bg,
    fontsize = fs
  )
```



3.9 Lines (borders)

The `style_tt` function allows us to customize the borders that surround eacell of a table, as well horizontal and vertical rules. To control these lines, we use the `line`, `line_width`, and `line_color` arguments. Here's a brief overview of each of these arguments:

- `line`: This argument specifies where solid lines should be drawn. It is a string that can consist of the following characters:
  - `"t"`: Draw a line at the top of the cell, row, or column.
  - `"b"`: Draw a line at the bottom of the cell, row, or column.
  - `"l"`: Draw a line at the left side of the cell, row, or column.
  - `"r"`: Draw a line at the right side of the cell, row, or column.
  - You can combine these characters to draw lines on multiple sides, such as `"tbl"` to draw lines at the top, bottom, and left sides of a cell.
- `line_width`: This argument controls the width of the solid lines in em units (default: 0.1 em). You can adjust this value to make the lines thicker or thinner.
- `line_color`: Specifies the color of the solid lines. You can use color names, hexadecimal codes, or other color specifications to define the line color.

Here is an example where we draw lines around every border ("t", "b", "l", and "r") of specified cells.

```
tt(x, theme = "empty") |>
  style_tt(
    i = 0:3,
    j = 1:3,
    line = "tblr",
    line_width = 0.4,
    line_color = "orange"
  )
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

And here is an example with horizontal rules:

```
tt(x, theme = "empty") |>
  style_tt(i = 0, line = "t", line_color = "orange", line_width = 0.4) |>
```

```
  style_tt(i = 1, line = "t", line_color = "purple", line_width = 0.2) |>
  style_tt(i = 4, line = "b", line_color = "orange", line_width = 0.4)
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

```
dat <- data.frame(1:2, 3:4, 5:6, 7:8)

tt(dat, theme = "empty", colnames = FALSE) |>
  style_tt(
    line = "tblr", line_color = "white", line_width = 0.5,
    background = "blue", color = "white"
  )
```

1	3	5	7
2	4	6	8

3.10 Markdown

Markdown is a text-only format with limited styling options. The only supported arguments are: `bold`, `italic`, and `strikeout`. These limitations exist because there is no standard markdown syntax for other styling options (ex: colors and background).

However, in terminals (consoles) that support it, `tinytable` can display colors and text styles using ANSI escape codes by setting `theme_markdown(ansi = TRUE)`. This allows for rich formatting in compatible terminal environments.

Here's an example with multiple ANSI styles:

```
data <- data.frame(
  Name = c("Alice", "Bob", "Charlie"),
  Age = c(25, 30, 35),
  Score = c(95.5, 87.2, 92.8)
)

tt(data, caption = "Three friends.") |>
  style_tt(i = c(0, 3), color = "orange") |>
  style_tt(i = 1, background = "teal", color = "black", bold = TRUE) |>
  style_tt(i = 2, j = 2, underline = TRUE, color = "red") |>
  style_tt(i = 3, strikeout = TRUE) |>
```

```
group_tt(j = list("Characteristics" = 2:3)) |>
style_tt(i = "caption", bold = TRUE, color = "red") |>
theme_markdown(ansi = TRUE)
```

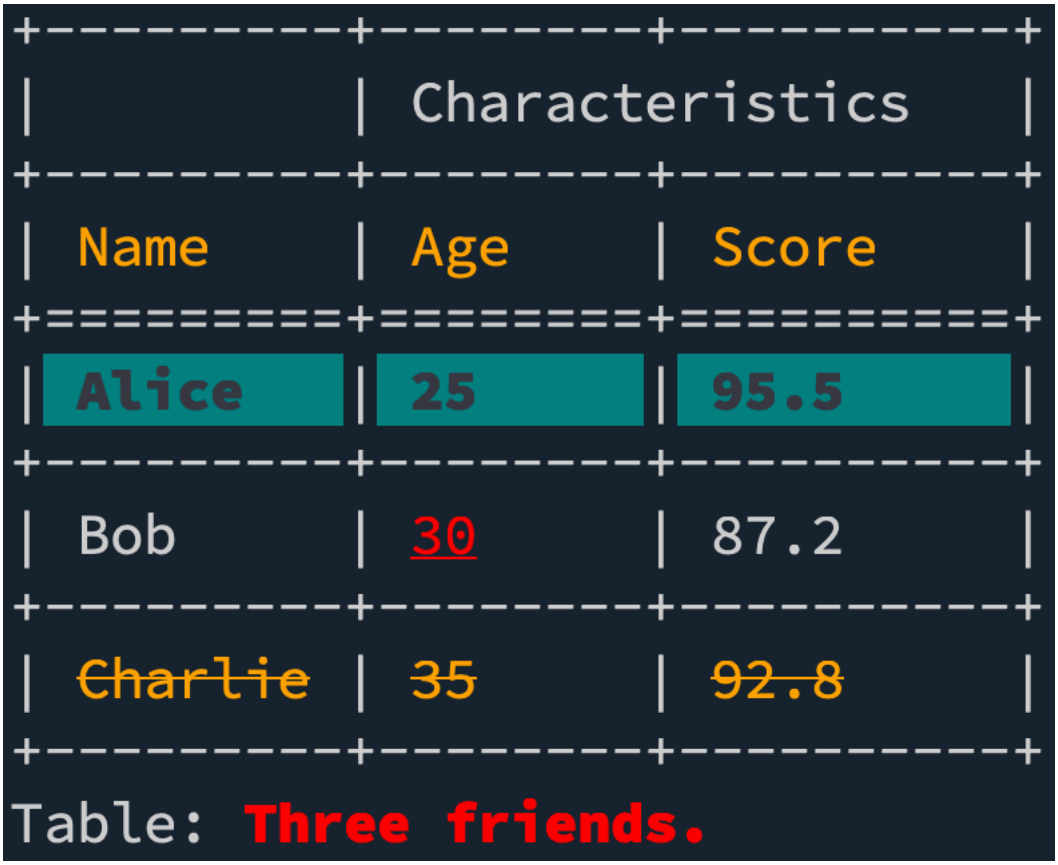


Figure 1: ANSI Terminal Output

4 Groups and labels

```
library(tinytable)
options(tinytable_tt_digits = 3)
options(tinytable_latex_placement = "H")
x <- mtcars[1:4, 1:5]
```

The `group_tt()` function can label groups of rows (`i`) or columns (`j`).

4.1 Rows

The `i` argument accepts a named list of integers. The numbers identify the positions where row group labels are to be inserted. The names includes the text that should be inserted:

```
dat <- mtcars[1:9, 1:8]
```

```
tt(dat) |>
  group_tt(i = list(
    "I like (fake) hamburgers" = 3,
    "She prefers halloumi" = 4,
    "They love tofu" = 7))
```

mpg	cyl	disp	hp	drat	wt	qsec	vs
21	6	160	110	3.9	2.62	16.5	0
21	6	160	110	3.9	2.88	17	0
I like (fake) hamburgers							
22.8	4	108	93	3.85	2.32	18.6	1
She prefers halloumi							
21.4	6	258	110	3.08	3.21	19.4	1
18.7	8	360	175	3.15	3.44	17	0
18.1	6	225	105	2.76	3.46	20.2	1
They love tofu							
14.3	8	360	245	3.21	3.57	15.8	0
24.4	4	147	62	3.69	3.19	20	1
22.8	4	141	95	3.92	3.15	22.9	1

The numbers in the `i` list indicate that a label must be inserted at position # in the original table (without row groups). For example,

```
tt(head(iris)) |>
  group_tt(i = list("After 0" = 1, "After 3a" = 4, "After 3b" = 4, "After 5" =
6))
```

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
After 0				
5.1	3.5	1.4	0.2	setosa
4.9	3	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa
After 3a				
After 3b				
4.6	3.1	1.5	0.2	setosa

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5	3.6	1.4	0.2	setosa
After 5				
5.4	3.9	1.7	0.4	setosa

It is also possible to use unquoted expressions (non-standard evaluation) to specify row groups. For example,

```
tmp <- do.call(rbind, by(iris, ~Species, head, n = 2))
tt(tmp) |>
  group_tt(i = Species) |>
  subset(select = -Species) |>
  style_tt(align = "c") |>
  style_tt(i = "groupi", align = "c", color = "teal", line = "b")
```

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width
setosa			
5.1	3.5	1.4	0.2
4.9	3	1.4	0.2
versicolor			
7	3.2	4.7	1.4
6.4	3.2	4.5	1.5
virginica			
6.3	3.3	6	2.5
5.8	2.7	5.1	1.9

4.1.1 Styling row groups

We can style group rows in the same way as regular rows (caveat: not in Word or Markdown):

```
tab <- tt(dat) |>
  group_tt(i = list(
      "I like (fake) hamburgers" = 3,
      "She prefers halloumi" = 4,
      "They love tofu" = 7))

tab |> style_tt(
    i = c(3, 5, 9),
    align = "c",
    color = "white",
```

```
    background = "gray",
    bold = TRUE)
```

mpg	cyl	disp	hp	drat	wt	qsec	vs
21	6	160	110	3.9	2.62	16.5	0
21	6	160	110	3.9	2.88	17	0
I like (fake) hamburgers							
22.8	4	108	93	3.85	2.32	18.6	1
She prefers halloumi							
21.4	6	258	110	3.08	3.21	19.4	1
18.7	8	360	175	3.15	3.44	17	0
18.1	6	225	105	2.76	3.46	20.2	1
They love tofu							
14.3	8	360	245	3.21	3.57	15.8	0
24.4	4	147	62	3.69	3.19	20	1
22.8	4	141	95	3.92	3.15	22.9	1

Calculating the location of rows can be cumbersome. Instead of doing this by hand, we can use the "groupi" shortcut to style rows and "~groupi" (the complement) to style all non-group rows.

```
tab |>
  style_tt("groupi", color = "white", background = "teal") |>
  style_tt("~groupi", j = 1, indent = 2)
```

mpg	cyl	disp	hp	drat	wt	qsec	vs
21	6	160	110	3.9	2.62	16.5	0
21	6	160	110	3.9	2.88	17	0
I like (fake) hamburgers							
22.8	4	108	93	3.85	2.32	18.6	1
She prefers halloumi							
21.4	6	258	110	3.08	3.21	19.4	1
18.7	8	360	175	3.15	3.44	17	0
18.1	6	225	105	2.76	3.46	20.2	1
They love tofu							

mpg	cyl	disp	hp	drat	wt	qsec	vs
14.3	8	360	245	3.21	3.57	15.8	0
24.4	4	147	62	3.69	3.19	20	1
22.8	4	141	95	3.92	3.15	22.9	1

4.1.2 Automatic row groups

We can use the `group_tt()` function to group rows and label them using spanners (almost) automatically. For example,

```
# subset and sort data
df <- mtcars |>
  head(10) |>
  sort_by(~am)

# draw table
tt(df) |> group_tt(i = df$am)
```

mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
0										
21.4	6	258	110	3.08	3.21	19.4	1	0	3	1
18.7	8	360	175	3.15	3.44	17	0	0	3	2
18.1	6	225	105	2.76	3.46	20.2	1	0	3	1
14.3	8	360	245	3.21	3.57	15.8	0	0	3	4
24.4	4	147	62	3.69	3.19	20	1	0	4	2
22.8	4	141	95	3.92	3.15	22.9	1	0	4	2
19.2	6	168	123	3.92	3.44	18.3	1	0	4	4
1										
21	6	160	110	3.9	2.62	16.5	0	1	4	4
21	6	160	110	3.9	2.88	17	0	1	4	4
22.8	4	108	93	3.85	2.32	18.6	1	1	4	1

4.1.3 Row matrix insertion

While the traditional `group_tt(i = list(...))` approach is useful for adding individual labeled rows, sometimes you need to insert multiple rows of data at specific positions. The matrix insertion feature provides a more efficient way to do this.

Instead of creating multiple named list entries, you can specify row positions as an integer vector in `i` and provide a character matrix in `j`. This is particularly useful when you want to insert the same content (like headers or separators) at multiple positions:

```
rowmat <- matrix(colnames(iris))

tt(head(iris, 7)) |>
  group_tt(i = c(2, 5), j = rowmat)
```

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5.1	3.5	1.4	0.2	setosa
Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
4.9	3	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa
4.6	3.1	1.5	0.2	setosa
Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5	3.6	1.4	0.2	setosa
5.4	3.9	1.7	0.4	setosa
4.6	3.4	1.4	0.3	setosa

The matrix is expected to have the same number of columns as the table. However, if you provide a single-column matrix with a number of elements that is a multiple of the table's column count, it will be automatically reshaped to match the table structure. This makes it easy to provide data in a linear format:

```
rowmat <- matrix(c(
  "-", "-", "-", "-", "-",
  "/", "/", "/", "/", "/"))

tt(head(iris, 7)) |> group_tt(i = 2, j = rowmat)
```

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5.1	3.5	1.4	0.2	setosa
-	-	-	-	-
/	/	/	/	/
4.9	3	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa
4.6	3.1	1.5	0.2	setosa

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5	3.6	1.4	0.2	setosa
5.4	3.9	1.7	0.4	setosa
4.6	3.4	1.4	0.3	setosa

We can also insert rows of the group matrix in different positions:

```
tt(head(iris, 7)) |> group_tt(i = c(1, 8), j = rowmat)
```

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
-	-	-	-	-
5.1	3.5	1.4	0.2	setosa
4.9	3	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa
4.6	3.1	1.5	0.2	setosa
5	3.6	1.4	0.2	setosa
5.4	3.9	1.7	0.4	setosa
4.6	3.4	1.4	0.3	setosa
/	/	/	/	/

4.2 Columns

The syntax for column groups is very similar, but we use the `j` argument instead. The named list specifies the labels to appear in column-spanning labels, and the values must be a vector of consecutive and non-overlapping integers that indicate which columns are associated to which labels:

```
tt(dat) |>
  group_tt(
    j = list(
      "Hamburgers" = 1:3,
      "Halloumi" = 4:5,
      "Tofu" = 7))
```

Hamburgers			Halloumi			Tofu	
mpg	cyl	disp	hp	drat	wt	qsec	vs
21	6	160	110	3.9	2.62	16.5	0
21	6	160	110	3.9	2.88	17	0

Hamburgers			Halloumi			Tofu	
mpg	cyl	disp	hp	drat	wt	qsec	vs
22.8	4	108	93	3.85	2.32	18.6	1
21.4	6	258	110	3.08	3.21	19.4	1
18.7	8	360	175	3.15	3.44	17	0
18.1	6	225	105	2.76	3.46	20.2	1
14.3	8	360	245	3.21	3.57	15.8	0
24.4	4	147	62	3.69	3.19	20	1
22.8	4	141	95	3.92	3.15	22.9	1

We can stack several extra headers on top of one another:

```
x <- mtcars[1:4, 1:5]
tt(x) |>
  group_tt(j = list("Foo" = 2:3, "Bar" = 5)) |>
  group_tt(j = list("Hello" = 1:2, "World" = 4:5))
```

Hello			World	
	Foo			Bar
mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

4.2.1 Styling column groups

To style column headers, we use zero or negative indices:

```
tt(x) |>
  group_tt(j = list("Foo" = 2:3, "Bar" = 5)) |>
  group_tt(j = list("Hello" = 1:2, "World" = 4:5)) |>
  style_tt(i = 0, color = "orange") |>
  style_tt(i = -1, color = "teal") |>
  style_tt(i = -2, color = "yellow")
```

Hello			World	
	Foo			Bar
mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

Alternatively, we can use string shortcuts:

```
tt(x) |>
  group_tt(j = list("Foo" = 2:3, "Bar" = 5)) |>
  group_tt(j = list("Hello" = 1:2, "World" = 4:5)) |>
  style_tt("groupj", color = "orange") |>
  style_tt("colnames", color = "teal")
```

Hello			World	
	Foo			Bar
mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

Here is a table with both row and column headers, as well as some styling:

```
dat <- mtcars[1:9, 1:8]
tt(dat) |>
  group_tt(
    i = list(
      "I like (fake) hamburgers" = 3,
      "She prefers halloumi" = 4,
      "They love tofu" = 7
    ),
    j = list(
      "Hamburgers" = 1:3,
      "Halloumi" = 4:5,
      "Tofu" = 7
    )
  ) |>
```

```
  style_tt(
    i = c(3, 5, 9),
    align = "c",
    background = "teal",
    color = "white"
  ) |>
  style_tt(i = -1, color = "teal")
```

Hamburgers			Halloumi			Tofu	
mpg	cyl	disp	hp	drat	wt	qsec	vs
21	6	160	110	3.9	2.62	16.5	0
21	6	160	110	3.9	2.88	17	0
I like (fake) hamburgers							
22.8	4	108	93	3.85	2.32	18.6	1
She prefers halloumi							
21.4	6	258	110	3.08	3.21	19.4	1
18.7	8	360	175	3.15	3.44	17	0
18.1	6	225	105	2.76	3.46	20.2	1
They love tofu							
14.3	8	360	245	3.21	3.57	15.8	0
24.4	4	147	62	3.69	3.19	20	1
22.8	4	141	95	3.92	3.15	22.9	1

4.2.2 Column names with delimiters

Group labels can be specified using column names with delimiters. For example, some of the columns in this data frame have group identifiers. Note that the first column does not have a group identifier, and that the last column has a group identifier but no column name.

```
dat <- data.frame(
  "A__D" = rnorm(3),
  "A_B_D" = rnorm(3),
  "A_B_" = rnorm(3),
  "_C_E" = rnorm(3),
  check.names = FALSE
)

tt(dat) |> group_tt(j = "_")
```

A			
	B		C
D	D	B	E
−0.811	−0.6033	0.326	2.851
−0.658	−0.6454	0.265	0.224
0.538	−0.0938	−0.812	−1.527

4.3 Case studies

4.3.1 Repeated column names

In some contexts, users wish to repeat the column names to treat them as group labels. Consider this dataset:

```
library(tinytable)
library(magrittr)

dat = data.frame(
  Region = as.character(state.region),
  State = row.names(state.x77),
  state.x77[, 1:3]) |>
  sort_by(~ Region + State) |>
  subset(Region %in% c("North Central", "Northeast"))
dat = do.call(rbind, by(dat, dat$Region, head, n = 3))
row.names(dat) = NULL
dat
```

```
         Region         State Population Income Illiteracy
1 North Central      Illinois      11197   5107        0.9
2 North Central       Indiana       5313   4458        0.7
3 North Central          Iowa       2861   4628        0.5
4     Northeast   Connecticut       3100   5348        1.1
5     Northeast         Maine       1058   3694        0.7
6     Northeast Massachusetts       5814   4755        1.1
```

Here, we may want to repeat the column names for every region. The `group_tt()` function does not support this directly, but it is easy to achieve this effect by:

1. Insert column names as new rows in the data.
2. Creat a row group variable (here: `region`)
3. Style the column names and group labels

Normally, we would call `style_tt(i = "groupi")` to style the row groups, but here we need the actual indices to also style one row below the groups. We can use the `@group_index_i` slot to get the indices of the row groups.

```
region_names <- unique(dat$Region)
region_indices <- rep(match(region_names, dat$Region), each = 2)

rowmat <- do.call(rbind, lapply(region_names, function(name) {
  rbind(
    c(name, rep("", 3)),
    colnames(dat)[2:5]
  )
}))

rowmat
```

```
     [,1]            [,2]         [,3]     [,4]
[1,] "North Central" ""           ""       ""
[2,] "State"         "Population" "Income" "Illiteracy"
[3,] "Northeast"     ""           ""       ""
[4,] "State"         "Population" "Income" "Illiteracy"
```

```
odd <- function(x) x[seq(1, length(x), 2)]
even <- function(x) x[seq(2, length(x), 2)]

tt(dat[, 2:5], colnames = FALSE) |>
  group_tt(i = region_indices, j = rowmat) |>
  style_tt(even(groupi), bold = TRUE) |>
  style_tt(odd(groupi), j = 1, align = "c", colspan = 4,
    background = "lightgrey")
```

North Central			
State	**Population**	**Income**	**Illiteracy**
Illinois	11197	5107	0.9
Indiana	5313	4458	0.7
Iowa	2861	4628	0.5
Northeast			
State	**Population**	**Income**	**Illiteracy**
Connecticut	3100	5348	1.1
Maine	1058	3694	0.7
Massachusetts	5814	4755	1.1

5 Themes

`tinytable` offers a very flexible theming framwork, which includes a few basic visual looks, as well as other functions to apply collections of transformations to `tinytable` objects in a repeatable way. These themes can be applied by supplying a string or function to the `theme` argument in `tt()`. Alternatively, users can call the specific theme functions like `theme_striped()`, `theme_grid()`, etc.

The main difference between theme functions and the other options in package, is that whereas `style_tt()` and `format_tt()` aim to be output agnostic, theme functions supply transformations that can be output-specific, and which can have their own sets of distinct arguments. See below for a few examples.

```
library(tinytable)
options(tinytable_tt_digits = 3)
options(tinytable_latex_placement = "H")
x <- mtcars[1:4, 1:5]
```

5.1 Visual themes

To begin, let's explore a few of the basic looks supplied by themes:

```
tt(x, theme = "striped")
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

```
tt(x) |> theme_striped()
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

```
tt(x, theme = "grid")
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

```
tt(x, theme = "empty")
```

mpg	cyl	disp	hp	drat
21	6	160	110	3.9
21	6	160	110	3.9
22.8	4	108	93	3.85
21.4	6	258	110	3.08

5.2 Custom themes

Users can also define their own themes to apply consistent visual tweaks to tables. For example, this defines a themeing function and sets a global option to apply it to all tables consistently:[1]

```
theme_vincent <- function(x, ...) {
  out <- x |>
    style_tt(color = "teal") |>
    theme_default()
  out@caption <- "Always use the same caption."
  out@width <- .5
  return(out)
}

options(tinytable_tt_theme = theme_vincent)

tt(mtcars[1:2, 1:2])
```

mpg	cyl
21	6
21	6

```
tt(mtcars[1:3, 1:3])
```

[1]Note: Captions must be defined in Quarto chunks for Typst output, which explains why they are not displayed in the Typst version of this document.

mpg	cyl	disp
21	6	160
21	6	160
22.8	4	108

```
options(tinytable_tt_theme = NULL)
```

Here is a slightly more complex example. The benefit of this approach is that we apply a function via the `style_tt()` function and its `finalize` argument, so we can leverage some of the object components that are only available at the printing stage:

```
theme_slides <- function(x, ...) {
  fn <- function(table) {
    if (isTRUE(table@output == "typst")) {
      table@table_string <- paste0("#figure([\n", table@table_string, "\n])")
    }
    return(table)
  }
  x <- style_tt(x, finalize = fn)
  return(x)
}

tt(head(iris), theme = theme_slides)
```

Note: the code above is not evaluated because it only applies to Typst output.

5.3 Combining themes

Themes are just functions that apply a set of transformations to a `tinytable` object. This means that users can combine themes to create new looks. For example, when we call `tt(x)` without specifying the `theme` argument, the `theme_default()` is applied automatically.

```
x <- head(iris, 3)
tt(x)
```

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5.1	3.5	1.4	0.2	setosa
4.9	3	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa

If we add a call to `theme_striped()`, we add grey background stripes, but keep the other default stylings (ex: top and bottom horizontal rules).

```
tt(x) |> theme_striped()
```

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5.1	3.5	1.4	0.2	setosa
4.9	3	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa

Alternatively, we could use `theme_empty()` to remove the default theme, and `theme_striped()` to get a very minimal look with just the stripes.

```
tt(x) |> theme_empty() |> theme_striped()
```

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5.1	3.5	1.4	0.2	setosa
4.9	3	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa

Or use the `theme` argument to get the same effect.

```
tt(x, theme = "empty") |> theme_striped()
```

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5.1	3.5	1.4	0.2	setosa
4.9	3	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa

5.4 User-written themes

This section provides a few user-written themes that can be used to extend the functionality of `tinytable`. These themes are not included in the package by default, but they can be easily added to your workflow. If you would like your own custom theme to appear here, please open an issue on the tinytable GitHub repository or submit a pull request.

5.4.1 `theme_mitex()`

This theme was written by Kazuharu Yanagimoto. Thanks for your contribution!

The MiTeX project aims to bring LaTeX support to Typst documents. This theme replace every instance of matching pairs of dollars signs `$..$` by a MiTeX function call: `#mitex(...)`. This allows you to use LaTeX math in Typst documents.

Warning: The substitution code is very simple and it may not work properly when there are unmatched `$` symbols in the document.

```
theme_mitex <- function(x, ...) {
    fn <- function(table) {
        if (isTRUE(table@output == "typst")) {
          table@table_string <- gsub(
            "\\$(.*?)\\$",
            "#mitex(`\\1`)",
            table@table_string)
        }
        return(table)
    }
    x <- style_tt(x, finalize = fn)
    return(x)
}
```

6 Plots and images

The `plot_tt()` function can embed images and plots in a `tinytable`. We can insert images by specifying their paths and positions (`i`/`j`).

```
library(tinytable)
options(tinytable_tt_digits = 3)
options(tinytable_latex_placement = "H")
x <- mtcars[1:4, 1:5]
```

6.1 Inserting images in tables

To insert images in a table, we use the `plot_tt()` function. The `path_img` values must be relative to the main document saved by `save_tt()` or to the Quarto (or Rmarkdown) document in which the code is executed.

```
dat <- data.frame(
  Species = c("Spider", "Squirrel"),
  Image = ""
)

img <- c(
  "figures/spider.png",
  "figures/squirrel.png"
)

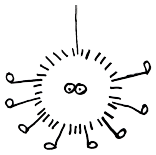
tt(dat) |>
  plot_tt(j = 2, images = img, height = 3)
```

Species	Image
Spider	
Squirrel	

In HTML tables, it is possible to insert tables directly from a web address, but not in LaTeX.

We can also combine text and images using the `sprintf` argument and `%s` placeholder:

```
tt(head(iris)) |>
    plot_tt(1, 1,
        images = "figures/spider.png",
        sprintf = "Boris: %s",
        height = 5) |>
    style_tt(i = 1, j = 1, alignv = "m")
```

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
Boris: 	3.5	1.4	0.2	setosa
4.9	3	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa
4.6	3.1	1.5	0.2	setosa
5	3.6	1.4	0.2	setosa
5.4	3.9	1.7	0.4	setosa

6.2 Inline plots

We can draw inline plots three ways, with

1. Built-in templates for histograms, density plots, and bar plots
2. Custom plots using base `R` plots.
3. Custom plots using `ggplot2`.

To draw custom plots, one simply has to define a custom function, whose structure we illustrate below.

6.2.1 Built-in plots

There are several types of inline plots available by default. For example,

```
plot_data <- list(mtcars$mpg, mtcars$hp, mtcars$qsec)

dat <- data.frame(
  Variables = c("mpg", "hp", "qsec"),
  Histogram = "",
  Density = "",
  Bar = "",
  Line = ""
)

# random data for sparklines
lines <- lapply(1:3, \(x) data.frame(x = 1:10, y = rnorm(10)))

tt(dat) |>
  plot_tt(j = 2, fun = "histogram", data = plot_data) |>
  plot_tt(j = 3, fun = "density", data = plot_data, color = "darkgreen") |>
  plot_tt(j = 4, fun = "bar", data = list(2, 3, 6), color = "orange") |>
  plot_tt(j = 5, fun = "line", data = lines, color = "blue") |>
  style_tt(j = 2:5, align = "c")
```

Variables	Histogram	Density	Bar	Line
mpg				
hp				
qsec				

6.2.2 Custom plots: Base R

Important: Custom functions must have `...` as an argument.

To create a custom inline plot using Base R plotting functions, we create a function that returns another function. `tinytable` will then call that second function internally to generate the plot.

This is easier than it sounds! For example:

```
f <- function(d, ...) {
  function() hist(d, axes = FALSE, ann = FALSE, col = "lightblue")
}

plot_data <- list(mtcars$mpg, mtcars$hp, mtcars$qsec)

dat <- data.frame(Variables = c("mpg", "hp", "qsec"), Histogram = "")
```

```
tt(dat) |>
  plot_tt(j = 2, fun = f, data = plot_data)
```

Variables	Histogram
mpg	
hp	
qsec	

6.2.3 Custom plots: `ggplot2`

Important: Custom functions must have `...` as an argument.

To create a custom inline plot using `ggplot2`, we create a function that returns a `ggplot` object:

```
library(ggplot2)

f <- function(d, color = "black", ...) {
  d <- data.frame(x = d)
  ggplot(d, aes(x = x)) +
    geom_histogram(bins = 30, color = color, fill = color) +
    scale_x_continuous(expand = c(0, 0)) +
    scale_y_continuous(expand = c(0, 0)) +
    theme_void()
}

plot_data <- list(mtcars$mpg, mtcars$hp, mtcars$qsec)

tt(dat) |>
  plot_tt(j = 2, fun = f, data = plot_data, color = "pink")
```

Variables	Histogram
mpg	
hp	
qsec	

We can insert arbitrarily complex plots by customizing the `ggplot2` call:

```
penguins <- read.csv(
  "https://vincentarelbundock.github.io/Rdatasets/csv/palmerpenguins/penguins.
csv",
  na.strings = ""
```

```
) |> na.omit()

# split data by species
dat <- split(penguins, penguins$species)
body <- lapply(dat, \(x) x$body_mass_g)
flip <- lapply(dat, \(x) x$flipper_length_mm)

# create nearly empty table
tab <- data.frame(
  "Species" = names(dat),
  "Body Mass" = "",
  "Flipper Length" = "",
  "Body vs. Flipper" = "",
  check.names = FALSE
)

# custom ggplot2 function to create inline plot
f <- function(d, ...) {
  ggplot(d, aes(x = flipper_length_mm, y = body_mass_g, color = sex)) +
    geom_point(size = 2) +
    scale_x_continuous(expand = c(0, 0)) +
    scale_y_continuous(expand = c(0, 0)) +
    scale_color_manual(values = c("#E69F00", "#56B4E9")) +
    theme_void() +
    theme(legend.position = "none")
}

# `tinytable` calls
tt(tab) |>
  plot_tt(j = 2, fun = "histogram", data = body, height = 2) |>
  plot_tt(j = 3, fun = "density", data = flip, height = 2) |>
  plot_tt(j = 4, fun = f, data = dat, height = 2) |>
  style_tt(alignv = "m") |>
  style_tt(j = 2:4, align = "c")
```

Species	Body Mass	Flipper Length	Body vs. Flipper
Adelie			
Chinstrap			
Gentoo			

7 Tips and Tricks

7.1 Typst

7.1.1 Multi-page long tables

The Typst tables created by `tinytable` are automatically broken across pages with repeated headers. However, in Quarto documents, the Quarto software wraps tables in an non-breakable `#figure` environment. This can break the display of long tables. One solution is to use a raw Typst code block to set Figures to be breakable:

````
---
format: typst
---

```{=typst}
#show figure: set block(breakable: true)
```

```{r}
#| tbl-cap: "blah blah blah"
#| label: tbl-blah
library(tinytable)
tt(head(iris, 50))
```
````

7.1.2 `kind`

By default, `tinytable` adds `kind:"tinytable"` to all tables produced by the package. This can easily be modified using the `finalize` argument of the `style_tt()` function, and it can be applied automatically to all tables by setting a default theme. For example,

```
theme_fancy <- function(x, ...) {
  fancytable <- function(x) {
    if (x@output == "typst") {
    x@table_string <- sub(
        'kind: "tinytable"',
        'kind: "fancytable"',
        x@table_string, fixed = TRUE)
    }
    return(x)
  }
  x |> style_tt(finalize = fancytable)
}
options(tinytable_tt_theme = theme_fancy)

tt(head(iris)) |> print("typst")
```

7.1.3 `rowspan` and `colspan`

If a table has cells that span across the full table (`colspan` equal to `nrow(tab)`), the `rowspan` argument can collapse multiple rows into a single cell. See this forum post for explanation why:

https://forum.typst.app/t/why-is-a-rowspan-cell-with-colspan-equal-to-number-of-columns-seemingly-only-spanning-one-row/5047

7.2 Markdown

7.2.1 `style_tt()` does not apply to row headers

This is an important limitation, but it is difficult to get around. See this issue for discussion: https://github.com/vincentarelbundock/tinytable/issues/125

Users can use markdown styling directly in `group_tt()` to circumvent this. This is documented in the tutorial.

7.2.2 `rowspan` and `colspan`

These arguments are already implemented in the form of "pseudo-spans", meaning that we flush the content of adjacent cells, but do not modify the row or column borders. This is probably adequate for most needs.

One alternative would be to remove line segments in finalize_grid(). I tried this but it is tricky and the results were brittle, so I rolled it back. I'm open to considering a PR if someone wants to contribute code, but please discuss the feature design in an issue with me before working on this.

7.3 Removing elements with `theme_empty()`

In some cases, it is useful to remove elements of an existing `tinytable` object. For example, packages like `modelsummary` often return tables with default styling—such as borders and lines in specific position. If the user adds group labels manually, the original lines and borders will be misaligned.

The code below produces a regression table with group labels but misaligned horizontal rule.

```
#! warning: false
library(modelsummary)
library(tinytable)

mod <- lm(mpg ~ factor(cyl) + hp + wt - 1, data = mtcars)

modelsummary(mod) |>
    group_tt(
        i = list(
            "Cylinders" = 1,
            "Others" = 7
        )
    )
```

	(1)
Cylinders	
factor(cyl)4	35.846
	(2.041)
factor(cyl)6	32.487
	(2.811)
factor(cyl)8	32.660
	(3.835)
Others	
hp	-0.023
	(0.012)
wt	-3.181
	(0.720)
Num.Obs.	32
R2	0.989
R2 Adj.	0.986
AIC	154.5
BIC	163.3
Log.Lik.	-71.235
RMSE	2.24

To fix this, we can strip the lines and add them back in the correct position.

```
modelsummary(mod) |>
    theme_empty() |>
    group_tt(
        i = list(
            "Cylinders" = 1,
            "Others" = 7
        )
    ) |>
    style_tt(i = 12, line = "b", line_width = .05)
```

	(1)
Cylinders	
factor(cyl)4	35.846

	(1)
	(2.041)
factor(cyl)6	32.487
	(2.811)
factor(cyl)8	32.660
	(3.835)
Others	
hp	-0.023
	(0.012)
wt	-3.181
	(0.720)
Num.Obs.	32
R2	0.989
R2 Adj.	0.986
AIC	154.5
BIC	163.3
Log.Lik.	-71.235
RMSE	2.24

8 Gallery

This gallery shows advanced `tinytable` examples. A link to the full code and data required to reproduce the full HTML tables is given above each screenshot.

8.1 Students

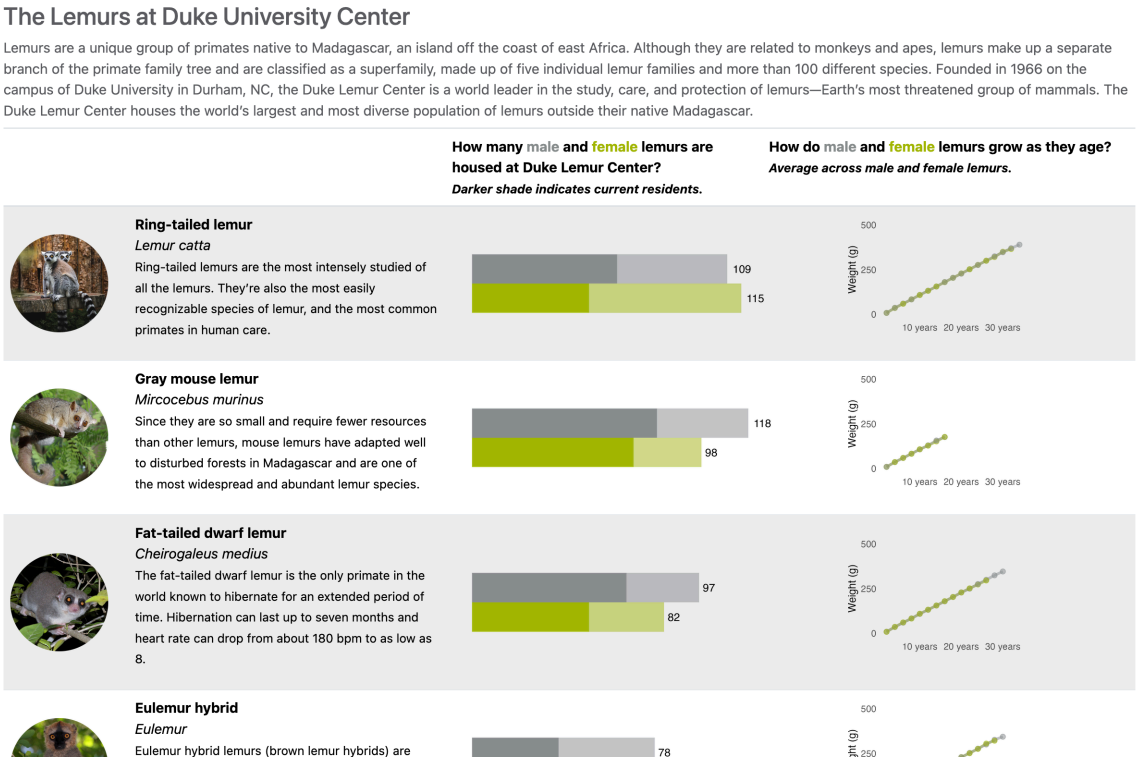
Original table designed by Illak Blog, who created the first version in `gt` format for the RStudio Table Contest. Code and data for the `tinytable` translation are available on GitHub.

		Unidades Educativas			Alumnos			Personal Docente		
Modalidad	Nivel	Total	Estatales	Privadas	Total	Estatales	Privadas	Total	Estatales	Privadas
Común	Inicial	1,757	1,444 (82.19%)	313 (17.81%)	132,342	96,631 (73.02%)	35,711 (26.98%)	10,512	6,768 (64.38%)	3,744 (35.62%)
	Primario	2,042	1,724 (84.43%)	318 (15.57%)	354,360	256,150 (72.29%)	98,210 (27.71%)	31,420	23,544 (74.93%)	7,876 (25.07%)
	Secundario	932	517 (55.47%)	415 (44.53%)	346,705	208,603 (60.17%)	138,102 (39.83%)	60,133	40,415 (67.21%)	19,718 (32.79%)
	Superior	207	83 (40.10%)	124 (59.90%)	76,736	45,014 (58.66%)	31,722 (41.34%)	10,159	5,525 (54.39%)	4,634 (45.61%)
Especial	Todos los niveles	101	60 (59.41%)	41 (40.59%)	5,019	2,765 (55.09%)	2,254 (44.91%)	2,764	1,827 (66.10%)	937 (33.90%)
Hospitalaria y Domiciliaria	Todos los niveles	3	2 (66.67%)	1 (33.33%)	396	386 (97.47%)	10 (2.53%)	111	100 (90.09%)	11 (9.91%)
Jóvenes y Adultos	Primario	178	177 (99.44%)	1 (0.56%)	4,560	4,543 (99.63%)	17 (0.37%)	466	464 (99.57%)	2 (0.43%)
	Secundario	136	111 (81.62%)	25 (18.38%)	38,332	33,425 (87.20%)	4,907 (12.80%)	7,385	6,936 (93.92%)	449 (6.08%)
Artística		33	28 (84.85%)	5 (15.15%)	9,700	8,659 (89.27%)	1,041 (10.73%)	594	510 (85.86%)	84 (14.14%)
Formación Profesional		83	83 (100.00%)		32,623	32,623 (100.00%)		641	641 (100.00%)	

Adapted from a table by Illak Zapata.

8.2 Lemurs

Original table designed by Nicola Rennie, who created the first version in `gt` format for the 2022 RStudio Table Contest. Code and data for the `tinytable` translation are available on GitHub.



8.3 Wines

Original table designed by Abdoul Madjid, who created the first version in `gt` format for the RStudio Table Contest. Code and data for the `tinytable` translation are available on Github.

Exceptional Wines

Great wines improve with age. Let's dive into some of the most extraordinary cuvées in the world. Those whose grapes possess ethereal aromas and pure minerality that give focus and energy. Those demonstrating great character, balance with good acidity and plush tannins.

	La Romanee Grand Cru Monopole	Domaine du Comte Liger-Belair 2013	Bourgogne	PINOT NOIR		4.9 27 reviews	$8,360	13.0%
	Sauternes	Château d'Yquem 1945	Bordeaux	SÉMILLON		4.9 39 reviews	$4,680	13.5%
	Wraith Cabernet Sauvignon	Hundred Acre 2014	California	CABERNET SAUVIGNON		4.9 79 reviews	$805	15.5%
	Vintage Port	Ferreira 2018	Duriense	TINTO CAO, TINTA BARROCA, CINSAULT, TOURIGA NACIONAL		4.9 95 reviews	$115	20.0%
	Grand Vin Pauillac (Premier Grand Cru Classé)	Château Latour 1990	Bordeaux	CABERNET SAUVIGNON, MERLOT, PETIT VERDOT		4.8 1513 reviews	$1,580	13.5%
	Pessac-Léognan (Premier Grand Cru Classé)	Château Haut-Brion 1989	Bordeaux	MERLOT, CABERNET SAUVIGNON, CABERNET FRANC		4.8 1245 reviews	$1,350	13.0%
	Unico	Vega Sicilia 1999	Castilla y León	TEMPRANILLO, CABERNET SAUVIGNON		4.8 1636 reviews	$620	13.5%

Adapted from a beautiful table by Abdoul Madjid.

Bibliography