YOUR NAME, LICENCE

PDF DOCUMENT TEMPLATE, TUFTE HANDOUT

本テンプレートの使い方

前提条件

- **tidyverse**, **knitr**, **rmarkdown**, **psych**, **kableExtra** パッケージ[1]
- **RStudio**[2]
- **Noto フォント**（Linux）・**ヒラギノフォント**[3]（macOS）

[1] **R** 4.x 推奨

[2] v1.4 推奨

[3] 検証していないので推測です

作成手順

1. **tufte**, **tinytex** パッケージをインストールする
2. `tinytex::install_tinytex()` で **tinytex** をインストールする
3. `tinytex::tlmgr_install("haranoaji")` で原の味フォントをインストールする[4]
4. `latex/tufte_preamble.tex` を開いて OS 環境に見合ったフォント設定を有効にする[5]
5. 本ドキュメントを knit する
   - 必要な TeX パッケージは **tinytex** が自動的にインストールする
   - もし TeX のメッセージが出た場合にはログを参考に必要なパッケージをインストール[6]する
   - 出力フォーマットを変更したい場合は YAML の `output` 指定を変更する

[4] Windows 環境のみ

[5] 不要な設定は% 文字でコメントアウトします

[6] `tinytex::tlmgr_install("package")` を **RStudio** のコンソールから実行すればインストールできます

注意事項

- **tinytex** 以外の TeX/LaTeX を利用する場合は手動でパッケージをインストールしてください
  - **tinytex** 以外の TeX/LaTeX での動作は確認していません
  - **RStudio** での LaTeX エンジン指定は必ず `xelatex` を指定してください
- 本テンプレートは必要最低限の設定だけです
  - TeX/LaTeX のデフォルト仕様として図表は自動的に再配置されます[7]
  - 各種の指定方法は本ドキュメントに記述されています[8]
- Winodws 環境はレンダリングに時間がかかる場合があります
- 平仮名の「う (U)」が表示されない問題があります[9]

[7] **tufte** パッケージの仕様上図表の固定指定はできません

[8] ドキュメントサンプル (PDF)も参照してください

[9] Linux 環境で原ノ味フォントを指定した場合、Linux 環境では Noto フォントを指定してください

独自の関数定義

PDF ではインタラクティブな表が使えません。また、tufte は余白が広いので通常の表出力では表示できる項目数が限られてしまいます。そこで、表現の自由度を高めるために **kableExtra** パッケージと **psych** パッケージを用いた `df_print()` 関数[10]を定義してあります。以下は使い方の一例です。

[10] 詳細は **setup** チャンク内の関数が定義を参照方

```
mtcars[1:6, 1:6] %>%
  df_print(caption = " デフォルトの表示方法です")
```

Table 1: デフォルトの表示方法です

	mpg	cyl	disp	hp	drat	wt
Mazda RX4	21	6	160	110	3.9	2.62
Mazda RX4 Wag	21	6	160	110	3.9	2.88
Datsun 710	22.8	4	108	93	3.85	2.32
...	...	...	...	...	...	...

```
mtcars[, 1:6] %>%
  df_print(caption = " データの先頭と最後から規定行数表示します",
           head_tail = TRUE)
```

Table 2: データの先頭と最後から規定行数表示します

	mpg	cyl	disp	hp	drat	wt
Mazda RX4	21	6	160	110	3.9	2.62
Mazda RX4 Wag	21	6	160	110	3.9	2.88
Datsun 710	22.8	4	108	93	3.85	2.32
...	...	...	...	...	...	...
Ferrari Dino	19.7	6	145	175	3.62	2.77
Maserati Bora	15	8	301	335	3.54	3.57
Volvo 142E	21.4	4	121	109	4.11	2.78

```
mtcars %>%
  df_print(caption = " 全カラムを収めるためにスケールダウン表示します",
           scale_down = TRUE, head_tail = TRUE)
```

	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
Mazda RX4	21	6	160	110	3.9	2.62	16.46	0	1	4	4
Mazda RX4 Wag	21	6	160	110	3.9	2.88	17.02	0	1	4	4
Datsun 710	22.8	4	108	93	3.85	2.32	18.61	1	1	4	1
...	...	...	...	...	...	...	...	...	...	...	...
Ferrari Dino	19.7	6	145	175	3.62	2.77	15.5	0	1	5	6
Maserati Bora	15	8	301	335	3.54	3.57	14.6	0	1	5	8
Volvo 142E	21.4	4	121	109	4.11	2.78	18.6	1	1	4	2

Table 3: 全カラムを収めるためにスケールダウン表示します

Introduction

The Tufte handout style is a style that Edward Tufte uses in his books and handouts. Tufte's style is known for its extensive use of sidenotes, tight integration of graphics with text, and well-set typography. This style has been implemented in LaTeX and HTML/CSS[11], respectively. We have ported both implementations into the **tufte** package. If you want LaTeX/PDF output, you may use the `tufte_handout` format for handouts, and `tufte_book` for books. For HTML output, use `tufte_html`. These formats can be either specified in the YAML metadata at the beginning of an R Markdown document (see an example below), or passed to the `rmarkdown::render()` function. See Allaire et al. [2021] for more information about **rmarkdown**.

[11] See Github repositories tufte-latex and tufte-css

```
---
title: "An Example Using the Tufte Style"
author: "John Smith"
output:
  tufte::tufte_handout: default
  tufte::tufte_html: default
---
```

There are two goals of this package:

1. To produce both PDF and HTML output with similar styles from the same R Markdown document;
2. To provide simple syntax to write elements of the Tufte style such as side notes and margin figures, e.g. when you want a margin figure, all you need to do is the chunk option `fig.margin = TRUE`, and we will take care of the details for you, so you never need to think about `\begin{marginfigure} \end{marginfigure}` or `<span class="marginfigure"> </span>`; the LaTeX and HTML code under the hood may be complicated, but you never need to learn or write such code.

If you have any feature requests or find bugs in **tufte**, please do not hesitate to file them to `https://github.com/rstudio/tufte/issues`. For general questions, you may ask them on StackOverflow: `https://stackoverflow.com/tags/rmarkdown`.

Headings

This style provides first and second-level headings (that is, `#` and `##`), demonstrated in the next section. You may get unexpected output if you try to use `###` and smaller headings.

In his later books[12], Tufte starts each section with a bit of vertical space, a non-indented paragraph, and sets the first few words of the sentence in small caps. To accomplish this using this style, call the `newthought()` function in **tufte** in an *inline R expression* `` `r ` `` as demonstrated at the beginning of this paragraph.[13]

[12] Beautiful Evidence

[13] Note you should not assume **tufte** has been attached to your R session. You should either `library(tufte)` in your R Markdown document before you call `newthought()`, or use `tufte::newthought()`.

Figures

Margin Figures

Images and graphics play an integral role in Tufte's work. To place figures in the margin you can use the **knitr** chunk option `fig.margin = TRUE`. For example:

```
library(ggplot2)
mtcars2 <- mtcars
mtcars2$am <- factor(
  mtcars$am, labels = c('automatic', 'manual')
)
ggplot(mtcars2, aes(hp, mpg, color = am)) +
  geom_point() + geom_smooth() +
  theme(legend.position = 'bottom')
```

Note the use of the `fig.cap` chunk option to provide a figure caption. You can adjust the proportions of figures using the `fig.width` and `fig.height` chunk options. These are specified in inches, and will be automatically scaled down to fit within the handout margin.

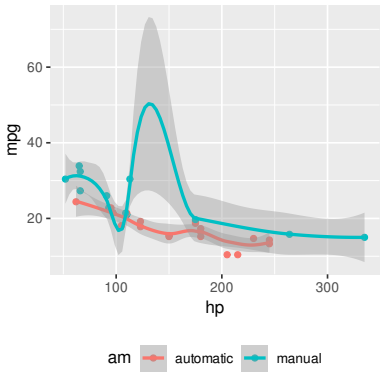


Figure 1: MPG vs horsepower, colored by transmission.

Arbitrary Margin Content

In fact, you can include anything in the margin using the **knitr** engine named `marginfigure`. Unlike R code chunks ```` ```{r} ````, you write a chunk starting with ```` ```{marginfigure} ```` instead, then put the content in the chunk. See an example on the right about the first fundamental theorem of calculus.

For the sake of portability between LaTeX and HTML, you should keep the margin content as simple as possible (syntax-wise) in the `marginefigure` blocks. You may use simple Markdown syntax like `**bold**` and `_italic_` text, but please refrain from using footnotes, citations, or block-level elements (e.g. blockquotes and lists) there.

Note: if you set `echo = FALSE` in your global chunk options, you will have to add `echo = TRUE` to the chunk to display a margin figure, for example ```` ```{marginfigure, echo = TRUE} ````.

We know from *the first fundamental theorem of calculus* that for x in $[a, b]$:

$$\frac{d}{dx}\left(\int_a^x f(u)\,du\right) = f(x).$$

Full Width Figures

You can arrange for figures to span across the entire page by using the chunk option `fig.fullwidth = TRUE`.

```
ggplot(diamonds, aes(carat, price)) + geom_smooth() +
  facet_grid(~ cut)
```

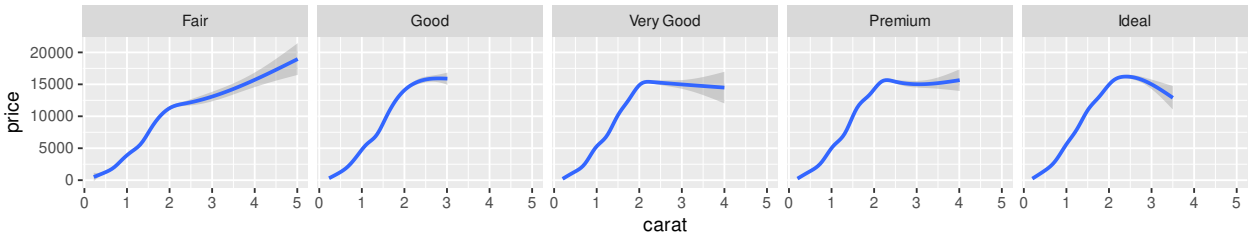


Figure 2: A full width figure.

Other chunk options related to figures can still be used, such as `fig.width`, `fig.cap`, `out.width`, and so on. For full width figures, usually `fig.width` is large and `fig.height` is small. In the above example, the plot size is 10×2.

Arbitrary Full Width Content

Any content can span to the full width of the page. This feature requires Pandoc 2.0 or above. All you need is to put your content in a fenced `Div` with the class `fullwidth`, e.g.,

```
::: {.fullwidth}
Any _full width_ content here.
:::
```

Below is an example:

R is free software and comes with ABSOLUTELY NO WARRANTY. You are welcome to redistribute it under the terms of the GNU General Public License versions 2 or 3. For more information about these matters see `https://www.gnu.org/licenses/`.

Main Column Figures

Besides margin and full width figures, you can of course also include figures constrained to the main column. This is the default type of figures in the LaTeX/HTML output.

```
ggplot(diamonds, aes(cut, price)) + geom_boxplot()
```

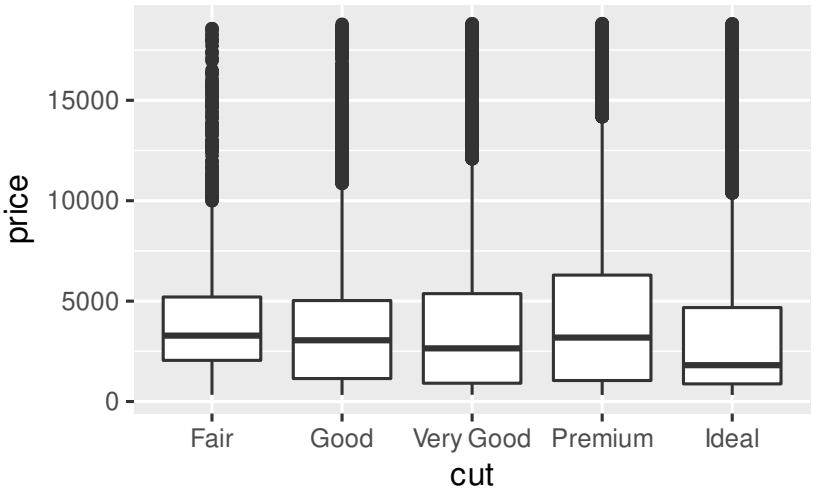


Figure 3: A figure in the main column.

Sidenotes

One of the most prominent and distinctive features of this style is the extensive use of sidenotes. There is a wide margin to provide ample room for sidenotes and small figures. Any use of a footnote will automatically be converted to a sidenote. [14]

If you'd like to place ancillary information in the margin without the sidenote mark (the superscript number), you can use the `margin_note()` function from **tufte** in an inline R expression. This function does not process the text with Pandoc, so Markdown syntax will not work here. If you need to write anything in Markdown syntax, please use the `marginfigure` block described previously.

[14] This is a sidenote that was entered using a footnote.

This is a margin note. Notice that there is no number preceding the note.

References

References can be displayed as margin notes for HTML output. For example, we can cite R here [R Core Team, 2021]. To enable this feature, you must set `link-citations: yes` in the YAML metadata, and the version of `pandoc-citeproc` should be at least 0.7.2. You can always install your own version of Pandoc from `https://pandoc.org/installing.html` if the version is not sufficient. To check the version of `pandoc-citeproc` in your system, you may run this in R:

```
system2('pandoc-citeproc', '--version')
```

If your version of `pandoc-citeproc` is too low, or you did not set `link-citations: yes` in YAML, references in the HTML output will be placed at the end of the output document.

Tables

You can use the `kable()` function from the **knitr** package to format tables that integrate well with the rest of the Tufte handout style. The table captions are placed in the margin like figures in the HTML output.

```
knitr::kable(
  mtcars[1:6, 1:6], caption = 'A subset of mtcars.'
)
```

Table 4: A subset of mtcars.

	mpg	cyl	disp	hp	drat	wt
Mazda RX4	21.0	6	160	110	3.90	2.620
Mazda RX4 Wag	21.0	6	160	110	3.90	2.875
Datsun 710	22.8	4	108	93	3.85	2.320
Hornet 4 Drive	21.4	6	258	110	3.08	3.215
Hornet Sportabout	18.7	8	360	175	3.15	3.440
Valiant	18.1	6	225	105	2.76	3.460

Block Quotes

We know from the Markdown syntax that paragraphs that start with `>` are converted to block quotes. If you want to add a right-aligned footer for the quote, you may use the function `quote_footer()` from **tufte** in an inline R expression. Here is an example:

> "If it weren't for my lawyer, I'd still be in prison. It went a lot faster with two people digging."
>
> — Joe Martin

Without using `quote_footer()`, it looks like this (the second line is just a normal paragraph):

> "Great people talk about ideas, average people talk about things, and small people talk about wine."
>
> — Fran Lebowitz

Responsiveness

The HTML page is responsive in the sense that when the page width is smaller than 760px, sidenotes and margin notes will be hidden by default. For sidenotes, you can click their numbers (the superscripts) to toggle their visibility. For margin notes, you may click the circled plus signs to toggle visibility.

More Examples

The rest of this document consists of a few test cases to make sure everything still works well in slightly more complicated scenarios. First we generate two plots in one figure environment with the chunk option `fig.show = 'hold'`:

```
p <- ggplot(mtcars2, aes(hp, mpg, color = am)) +
  geom_point()
p
p + geom_smooth()
```

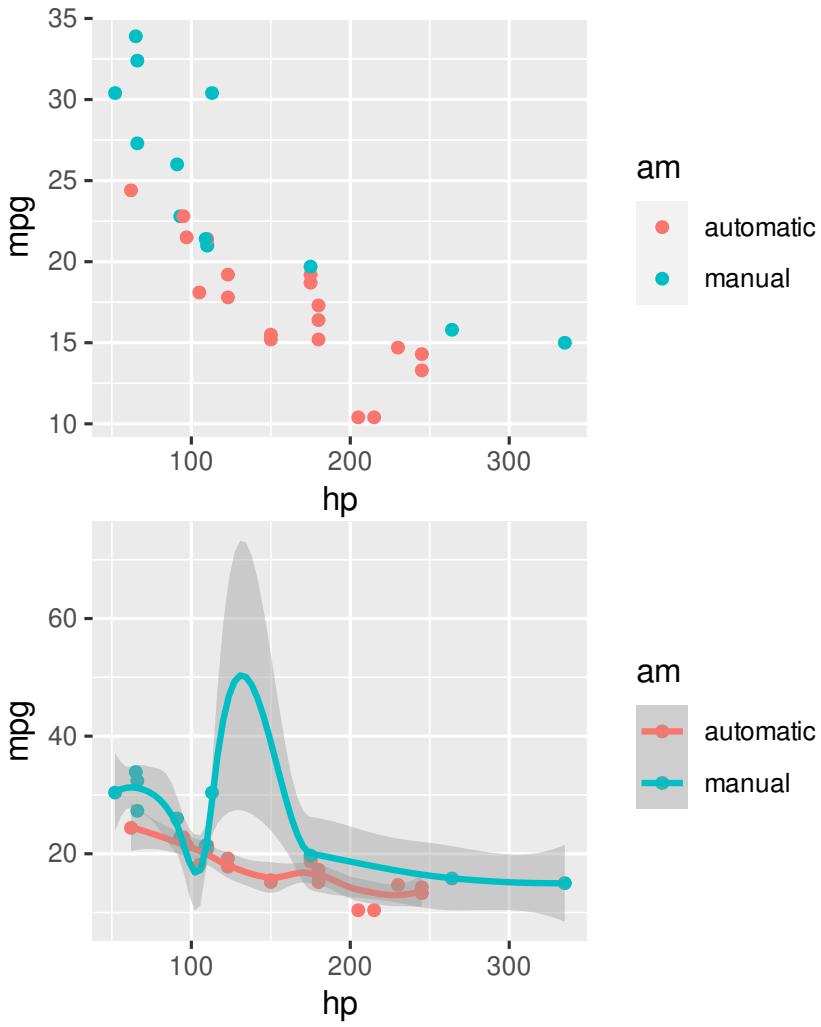


Figure 4: Two plots in one figure environment.

Then two plots in separate figure environments (the code is iden-

tical to the previous code chunk, but the chunk option is the default `fig.show = 'asis'` now):

```
p <- ggplot(mtcars2, aes(hp, mpg, color = am)) +
  geom_point()
p
```

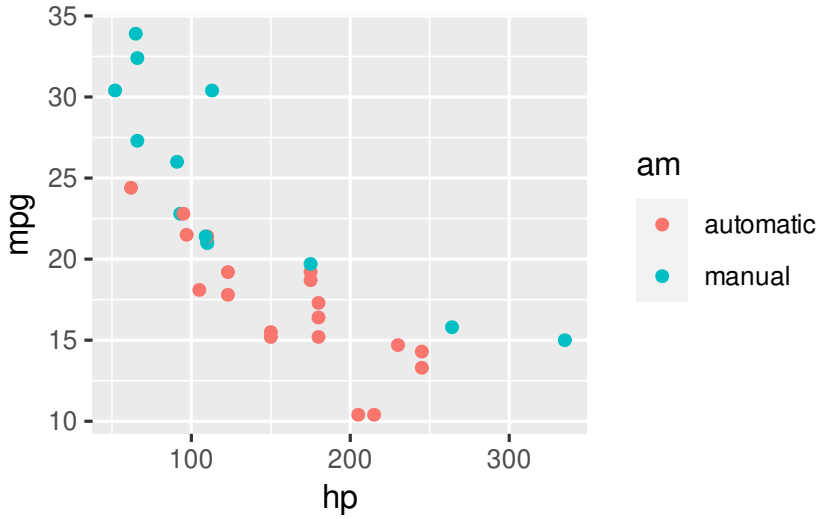


Figure 5: Two plots in separate figure environments (the first plot).

```
p + geom_smooth()
```

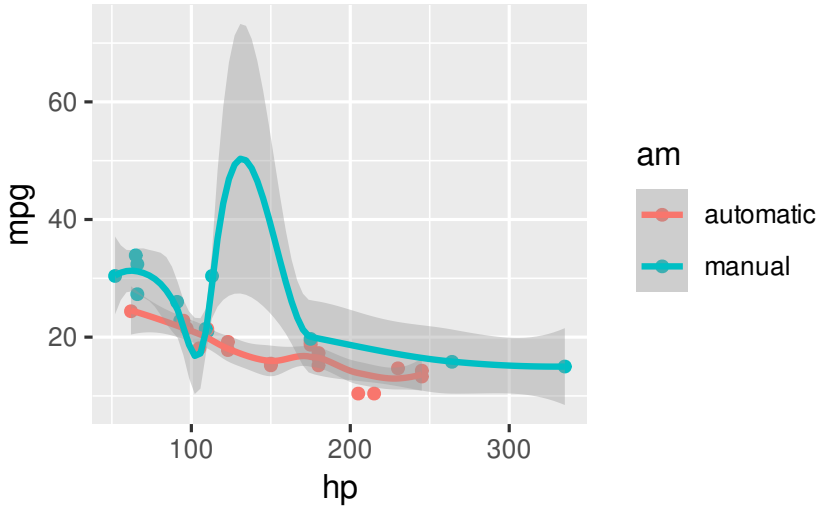


Figure 6: Two plots in separate figure environments (the second plot).

You may have noticed that the two figures have different captions, and that is because we used a character vector of length 2 for the chunk option `fig.cap` (something like `fig.cap = c('first plot', 'second plot')`).

Next we show multiple plots in margin figures. Similarly, two plots in the same figure environment in the margin:

```
p
p + geom_smooth(method = 'lm')
```

tufte

```
## `geom_smooth()` using formula 'y ~ x'
```

Then two plots from the same code chunk placed in different figure environments:

```
knitr::kable(head(iris, 15))
```

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5.1	3.5	1.4	0.2	setosa
4.9	3.0	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa
4.6	3.1	1.5	0.2	setosa
5.0	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
5.0	3.4	1.5	0.2	setosa
4.4	2.9	1.4	0.2	setosa
4.9	3.1	1.5	0.1	setosa
5.4	3.7	1.5	0.2	setosa
4.8	3.4	1.6	0.2	setosa
4.8	3.0	1.4	0.1	setosa
4.3	3.0	1.1	0.1	setosa
5.8	4.0	1.2	0.2	setosa

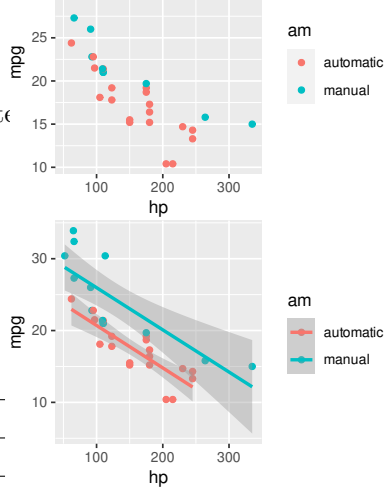


Figure 7: Two plots in one figure environment in the margin.

```
p
```

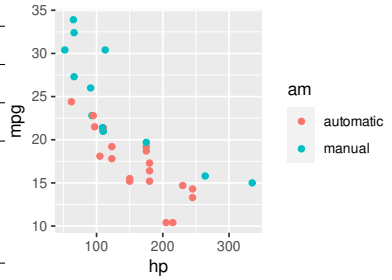


Figure 8: Two plots in separate figure environments in the margin (the first plot).

```
knitr::kable(head(iris, 12))
```

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5.1	3.5	1.4	0.2	setosa
4.9	3.0	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa
4.6	3.1	1.5	0.2	setosa
5.0	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
5.0	3.4	1.5	0.2	setosa
4.4	2.9	1.4	0.2	setosa
4.9	3.1	1.5	0.1	setosa
5.4	3.7	1.5	0.2	setosa
4.8	3.4	1.6	0.2	setosa

```
p + geom_smooth(method = 'lm')
```

```
## `geom_smooth()` using formula 'y ~ x'
```

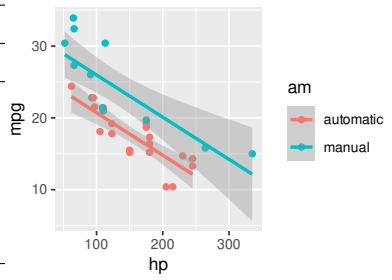


Figure 9: Two plots in separate figure environments in the margin (the second plot).

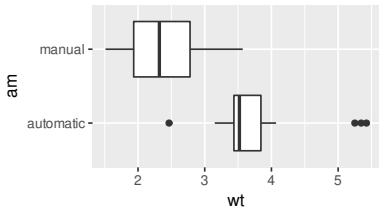
```
knitr::kable(head(iris, 5))
```

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5.1	3.5	1.4	0.2	setosa
4.9	3.0	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa
4.6	3.1	1.5	0.2	setosa
5.0	3.6	1.4	0.2	setosa

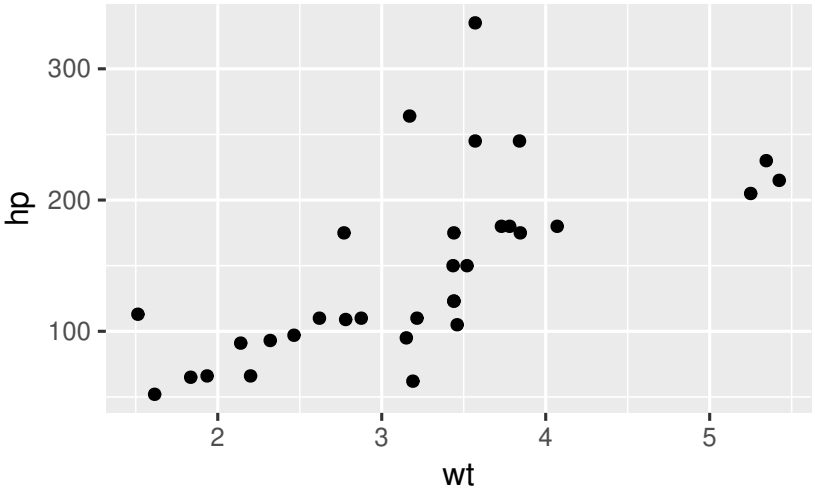
We blended some tables in the above code chunk only as *placeholders* to make sure there is enough vertical space among the margin figures, otherwise they will be stacked tightly together. For a practical document, you should not insert too many margin figures consecutively and make the margin crowded.

You do not have to assign captions to figures. We show three figures with no captions below in the margin, in the main column, and in full width, respectively.

```
# a boxplot of weight vs transmission; this figure
# will be placed in the margin
ggplot(mtcars2, aes(am, wt)) + geom_boxplot() +
  coord_flip()
```

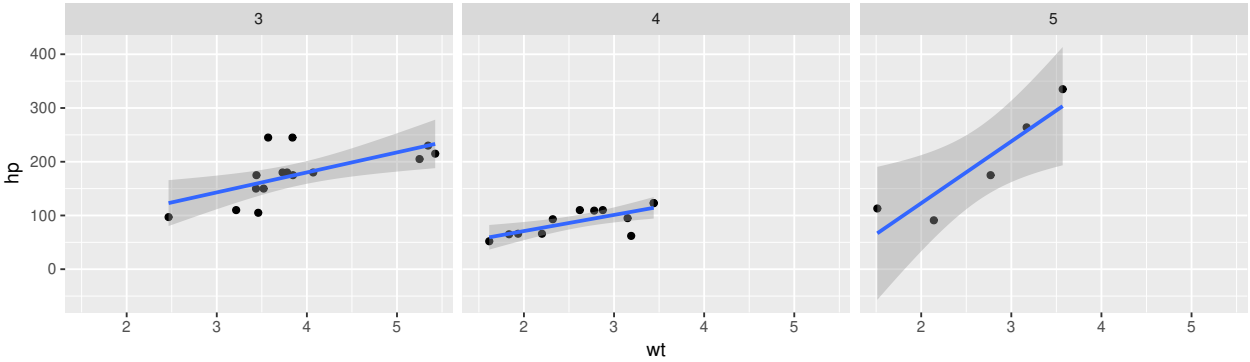



```
# a figure in the main column
p <- ggplot(mtcars, aes(wt, hp)) + geom_point()
p
```




```
# a fullwidth figure
p + geom_smooth(method = 'lm') + facet_grid(~ gear)
```

```
## `geom_smooth()` using formula 'y ~ x'
```



Some Notes on Tufte CSS

There are a few other things in Tufte CSS that we have not mentioned so far. If you prefer sans-serif fonts, use the function `sans_serif()` in **tufte**. For epigraphs, you may use a pair of underscores to make the paragraph italic in a block quote, e.g.

> *I can win an argument on any topic, against any opponent. People know this, and steer clear of me at parties. Often, as a sign of their great respect, they don't even invite me.*
>
> — Dave Barry

We hope you will enjoy the simplicity of R Markdown and this R package, and we sincerely thank the authors of the Tufte-CSS and Tufte-LaTeX projects for developing the beautiful CSS and LaTeX classes. Our **tufte** package would not have been possible without their heavy lifting.

You can turn on/off some features of the Tufte style in HTML output. The default features enabled are:

```
output:
  tufte::tufte_html:
    tufte_features: ["fonts", "background", "italics"]
```

If you do not want the page background to be lightyellow, you can remove `background` from `tufte_features`. You can also customize the style of the HTML page via a CSS file. For example, if you do not want the subtitle to be italic, you can define

```
h3.subtitle em {
  font-style: normal;
}
```

in, say, a CSS file `my_style.css` (under the same directory of your Rmd document), and apply it to your HTML output via the `css` option, e.g.,

```
output:
  tufte::tufte_html:
    tufte_features: ["fonts", "background"]
    css: "my_style.css"
```

There is also a variant of the Tufte style in HTML/CSS named "Envisoned CSS". This style can be used by specifying the argument `tufte_variant = 'envisioned'` in `tufte_html()`[15], e.g.

[15] The actual Envisioned CSS was not used in the **tufte** package. We only changed the fonts, background color, and text color based on the default Tufte style.

```
output:
  tufte::tufte_html:
    tufte_variant: "envisioned"
```

To see the R Markdown source of this example document, you may follow this link to Github, use the wizard in RStudio IDE (`File -> New File -> R Markdown -> From Template`), or open the Rmd file in the package:

```
file.edit(
  tufte:::template_resources(
    'tufte_html', '..', 'skeleton', 'skeleton.Rmd'
  )
)
```

This document is also available in Chinese, and its `envisioned` style can be found here.

Bibliography

JJ Allaire, Yihui Xie, Jonathan McPherson, Javier Luraschi, Kevin Ushey, Aron Atkins, Hadley Wickham, Joe Cheng, Winston Chang, and Richard Iannone. *rmarkdown: Dynamic Documents for R*, 2021. URL `https://CRAN.R-project.org/package=rmarkdown`. R package version 2.8.

R Core Team. *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria, 2021. URL `https://www.R-project.org/`.