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Document title

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1 The Article Header Information

Configure the YAML header including the following elements:

- **title**: Title
- **author**: Character of single or multiple author(s)
- **date**: The date; by default \date, will populate the date automatically.
- **fontsize**: Font size for body text; choose between 10pt, 11pt (default), and 12pt.
- **german**: If option is set to `true`, the table and figure caption, the page information, as well as the ToC and reference header will be in German; default is `false` (i.e., English).
- **linkcolor**, **filecolor**, **citecolor**, **urlcolor**: Specify here colors for internal links (incl. ToC), external links, citation links, and linked URLs, respectively, if you don't want the default colors; use options allowed by xcolor, including the dvipsnames, svgnames, and x11names lists.
- **classoption**: Further options for the document class `article` (used for this report); specify here whether report should be 'onesided' (default) or 'twosided'.
- **bibliography**: A path to the bibliography file(s) to use for references (BibTeX `.bib` file). This template uses the bibliography-related package `natbib`. The current file 'references.bib' in the 'bib/' folder includes 3 dummy references; either insert your references into this file or replace the file with your own.
- **bibliographystyle**: The style is provided in the `bibstyle bst` file, which adopts the **SAGE Harvard** reference style. Just leave the file as it is.
- **params**: The cover and logo image directories for the front page are specified here.
- **header_includes**: Here you can add additional \LaTeX code to include in the header, before the `\begin{document}` statement.
- If you want to add additional \LaTeX code to include before the `\end{document}` statement use the field `include_after`.
- **output**: The nested fields for the output field are based on the arguments of the output function. Since `UHHformats::pdf_report` is based on `rmarkdown::pdf_document`, see its help page for more options. Current default settings are
 - `toc = TRUE`
 - `toc_depth = 5`
 - `number_sections = TRUE`
 - `highlight = "kate"`
 - `font = "Helvetica"`
 - `citation_package = "natbib"`
 - `latex_engine = "xelatex"`

If you are associated with the UHH you can also use the University's own font "TheSansUHH". In that case replace `font = "Helvetica"` with `font = "TheSansUHH"`. To use another font, simply use the setting "other" and replace the 'font_XXX.ttf' files in the working directory with your own files. Please note, that you have to name these files exactly as the template font files.

2 The Body of the Article

2.1 R Markdown syntax vs \LaTeX syntax

As with any .Rmd file you can write the entire report in the R Markdown syntax. However, if you are familiar with \LaTeX you can also mix both:

2.1.1 R Markdown subsection

This is a dummy text to show you how to write in **bold** and in *italics*.

2.1.2 LaTeX subsection

This is a dummy text to show you that you can also write in **bold** and in *italics* with \LaTeX .

2.2 Cross-referencing within the report

To cross-references figures or tables you have to have a:

- **caption to your figure (or table):**
 - NOTE: figures without a caption will be included directly as images and will therefore not be a numbered figure
- **labeled code chunk:** this provides the identifier for referencing the figure or table generated by the chunk.

Cross-references within the text can then be made using the standard \LaTeX syntax `\@ref{type:label}`, where label is the chunk label and type is the environment being referenced (e.g. tab, fig, or eq). Examples are given in the sections below (e.g. in [R Markdown table](#)).

To cross-reference sections simply put the section header in square brackets, e.g. [R output](#) via `[R output]`.

2.3 Mathematics

Use mathematics in R Markdown as usual using the dollar sign \$; either in inline mode with one dollar sign, e.g. $E = mc^2$, or in display mode with two:

$$E = mc^2$$

Important to note: do not leave a space between the \$ and your mathematical notation.

Alternatively, you can use \LaTeX for more control, e.g. for setting equation numbers that can be cross-referenced:

$$\bar{X} = \frac{\sum_{i=1}^n X_i}{n} \tag{1}$$

You may refer to this equation using `\ref{eq:label}`, e.g., see Equation 1

2.4 R output

R output is typically shown in the monospace font (here an example with the `mtcars` dataset in the subfolder `data/`):

```
##          mpg          cyl         disp         hp
##  Min.   :10.40   Min.   :4.000   Min.   : 71.1   Min.   :52.0
##  1st Qu.:15.43   1st Qu.:4.000   1st Qu.:120.8   1st Qu.:96.5
##  Median :19.20   Median :6.000   Median :196.3   Median :123.0
##  Mean   :20.09   Mean   :6.188   Mean   :230.7   Mean   :146.7
##  3rd Qu.:22.80   3rd Qu.:8.000   3rd Qu.:326.0   3rd Qu.:180.0
##  Max.   :33.90   Max.   :8.000   Max.   :472.0   Max.   :335.0
```

2.5 Tables

2.5.1 R Markdown table

Table 1 is a R Markdown table including a caption (note: the table number is automatically assigned) and label for cross-referencing:

Table 1: Your Caption

A	New	Table
left-aligned	center-aligned	right-aligned
\$123	\$456	\$789
<i>italics</i>	strikethrough	boldface

2.5.2 Tables generated with R

2.5.2.1 Using the `knitr` and `kableExtra` packages

Table 2 is an example when using `knitr::kable()` to generate the table and `kableExtra` functions to modify it:

Table 2: A table produced with knitr and kableextra

	Group 5				Group 6	
	Group 1		Group 2		Group 3	Group 4
	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

Note:

Your comments go here.

2.5.2.2 The `xtable` package Another useful package for tables for PDF output is `xtable`. The following code will produce an example table if the `xtable` package is installed. Note that you

need to add the chunk option `results = "asis"` inside `{r}` otherwise the PDF will contain the `\LaTeX` code of the table!

Table 3: A table made with xtable

	mpg	cyl	disp	hp	drat	wt
Mazda RX4	21.00	6	160.00	110	3.90	2.62
Mazda RX4 Wag	21.00	6	160.00	110	3.90	2.88
Datsun 710	22.80	4	108.00	93	3.85	2.32
Hornet 4 Drive	21.40	6	258.00	110	3.08	3.21
Hornet Sportabout	18.70	8	360.00	175	3.15	3.44

You can also use `\LaTeX` in the R code chunk:

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5.10	3.50	1.40	0.20	setosa
4.90	3.00	1.40	0.20	setosa
4.70	3.20	1.30	0.20	setosa
4.60	3.10	1.50	0.20	setosa
5.00	3.60	1.40	0.20	setosa
5.40	3.90	1.70	0.40	setosa
4.60	3.40	1.40	0.30	setosa
5.00	3.40	1.50	0.20	setosa
4.40	2.90	1.40	0.20	setosa
4.90	3.10	1.50	0.10	setosa
5.40	3.70	1.50	0.20	setosa
4.80	3.40	1.60	0.20	setosa
4.80	3.00	1.40	0.10	setosa
4.30	3.00	1.10	0.10	setosa
5.80	4.00	1.20	0.20	setosa
5.70	4.40	1.50	0.40	setosa
5.40	3.90	1.30	0.40	setosa
5.10	3.50	1.40	0.30	setosa
5.70	3.80	1.70	0.30	setosa
5.10	3.80	1.50	0.30	setosa

2.6 Figures

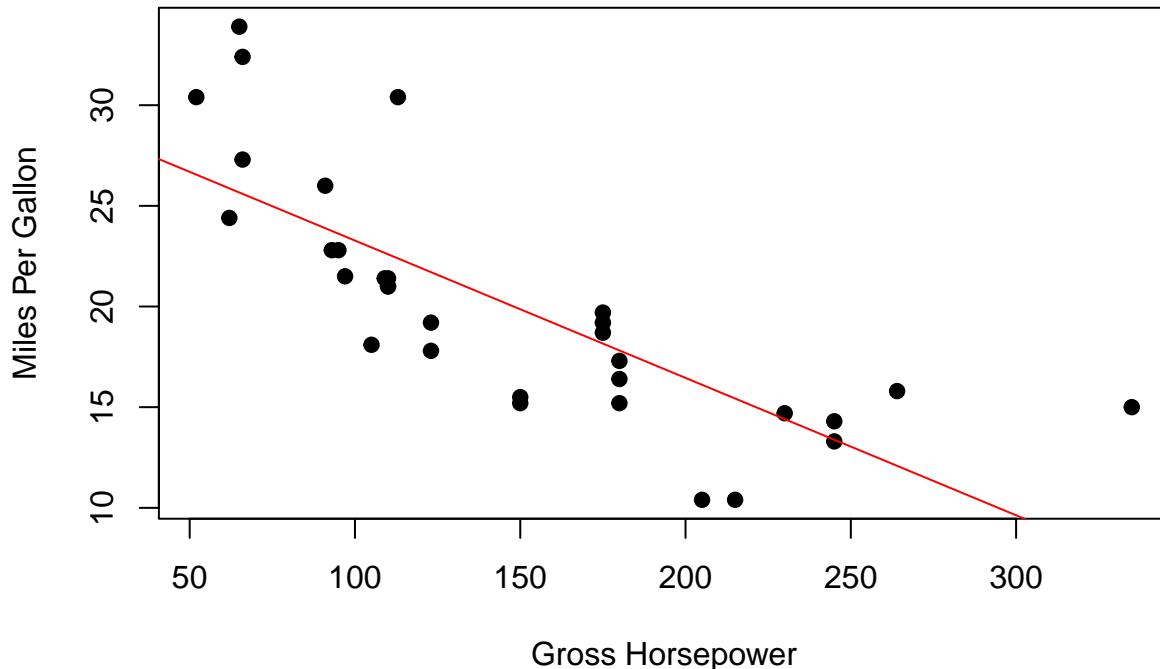


Figure 1: Relationship between horsepower and fuel economy

Figures are supported from R code and can be referenced (see Figure 1) by including the \\label{} tag in the fig.cap attribute of the R chunk: `fig.cap = "Relationship between horsepower and fuel economy\\label{fig:base-ref}"`. It is a quirky hack at the moment, see [here](#).

Figure 2 shows a boxplot with just half the width and centered:

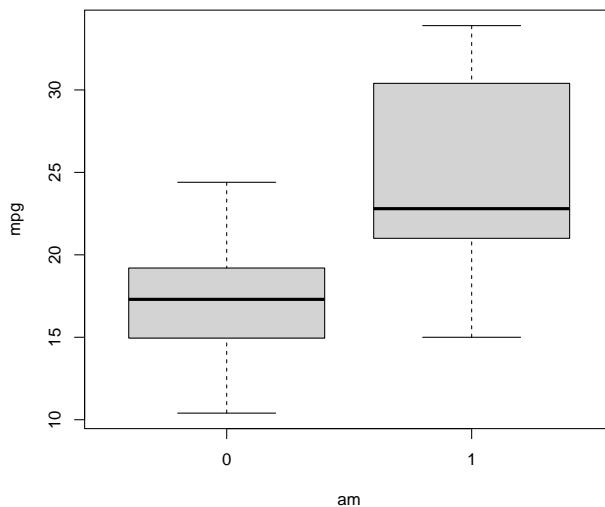


Figure 2: Fuel differences between transmission types (0 = automatic, 1 = manual)

3 Adding citations and bibliography

Link a `.bib` document via the YAML header and the bibliography will be printed at the very end (as usual). The default bibliography style is provided in the `bib.bst` file (do not delete), which adopts the **SAGE Harvard** reference style.

References can be cited directly within the document using the R Markdown equivalent of the \LaTeX citation system `[@key]`, where key is the citation key in the first line of the entry in the `.bib` file. Example: ([Taylor and Green, 1937](#)). To cite multiple entries, separate the keys by semicolons, e.g. ([Knupp, 1999](#); [Kamm, 2000](#)).

There is also the package `citr`, which I highly recommend: `citr` provides functions and an RStudio add-in to search a BibTeX-file to create and insert formatted Markdown citations into the current document. If you are using the reference manager **Zotero** the add-in can access your reference database directly.

3.1 Software

If you want to include a paragraph on the software used, here is some example text/code to get the current R and package versions. The code to create a separate bibliography file named ‘`packages.bib`’ with all package references has already been added at the beginning of this script (code chunk ‘`generate-package-refs`’).

All analyses were performed using the statistical software R (version 4.1.2) ([R Core Team, 2021](#)). This report, including tables and figures, was generated using the packages ‘`rmarkdown`’ (version 2.14) ([Allaire et al., 2022](#)), ‘`knitr`’ (version 1.39) ([Xie, 2022](#)), ‘`kableExtra`’ (version 1.3.4) ([Zhu, 2021](#)), ‘`xtable`’ (version 1.8.4) ([Dahl et al., 2019](#)), and ‘`tidyverse`’ (version 1.3.1) ([Wickham, 2021](#))

4 References

- Allaire J, Xie Y, McPherson J, Luraschi J, Ushey K, Atkins A, Wickham H, Cheng J, Chang W and Iannone R (2022) *rmarkdown: Dynamic Documents for R*. URL <https://CRAN.R-project.org/package=rmarkdown>. R package version 2.14.
- Dahl DB, Scott D, Roosen C, Magnusson A and Swinton J (2019) *xtable: Export Tables to LaTeX or HTML*. URL <http://xtable.r-forge.r-project.org/>. R package version 1.8-4.
- Kamm J (2000) Evaluation of the Sedov-von Neumann-Taylor blast wave solution. Technical Report Technical Report LA-UR-00-6055, Los Alamos National Laboratory.
- Knupp P (1999) Winslow smoothing on two-dimensional unstructured meshes. *Eng Comput* 15: 263–268.
- R Core Team (2021) *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>.
- Taylor G and Green A (1937) Mechanism of the production of small eddies from large ones. *P Roy Soc Lond A Mat* 158(895): 499–521.
- Wickham H (2021) *tidyverse: Easily Install and Load the Tidyverse*. URL <https://CRAN.R-project.org/package=tidyverse>. R package version 1.3.1.
- Xie Y (2022) *knitr: A General-Purpose Package for Dynamic Report Generation in R*. URL <https://yihui.org/knitr/>. R package version 1.39.
- Zhu H (2021) *kableExtra: Construct Complex Table with kable and Pipe Syntax*. URL <https://CRAN.R-project.org/package=kableExtra>. R package version 1.3.4.