A Sample Article Using `quarto-ieee` for IEEE Journal and Transactions

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Abstract—This document describes the most common article elements and how to use the **quarto-ieee** class with Pandoc/Quarto-Markdown to produce files that are suitable for submission to IEEE journals. **quarto-ieee** can produce conference, journal, and technical note (correspondence) papers with a suitable choice of class options. It intends to generate PDF and HTML outputs that closely mimick what IEEE would generate.

Index Terms—IEEE, IEEEtran, journal, Quarto, Pandoc, template

I. How to Use Cache in Quarto

A. Global Cache

First, we need to activate the cache globally for the entire document. This means that all chunks that are executed will be cached and will not be executed again unless there is a change in the code or dependencies.

```
```{r setup, include=FALSE}
knitr::opts_chunk$set(echo = FALSE,
                             cache=TRUE)
```
```

B. Simple Plot Example with Global Cache

This chunk uses the global cache. After the first execution, the cached result will be used, so the plot won't be regenerated unless the code or data changes.
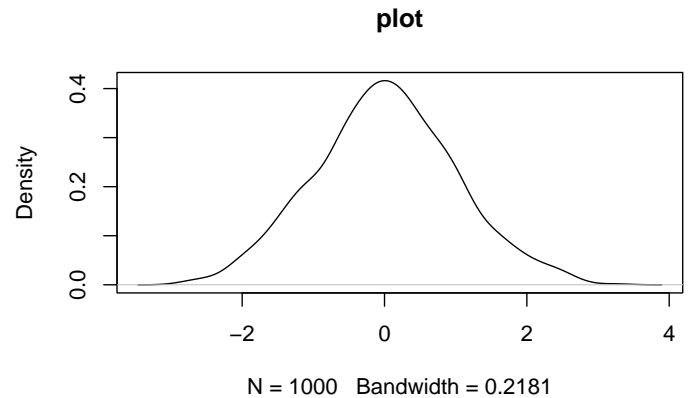
```
set.seed(123)
data <- rnorm(1000)

plot(density(data), main = "plot")
```

The `quarto-ieee` template is freely available under the MIT license on github: https://github.com/dfolio/quarto-ieee.

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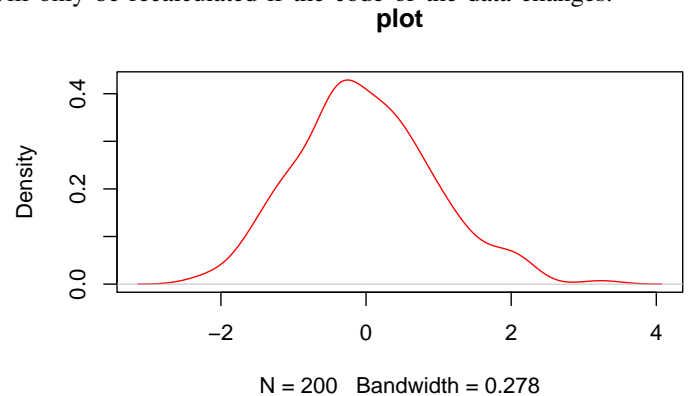Unknown affiliation
John Doe is with Anonymous University

C. Cache in a Specific Chunk

This chunk caches the summary table calculation. The table will only be recalculated if the code or the data changes.

D. Using if (!file.exists(…)) to Save Data

This chunk uses the if (!file.exists(…)) condition to avoid recalculating the data if the file already exists. If the file exists, it loads the saved data; otherwise, it runs the computation and saves the results to the file. This approach is useful for collaboration, where you can share the file and avoid recomputation on other machines.

```
# This code will be displayed in the document

# Check if the data file exists and save the resul

if (!file.exists("saved_data.Rdata")) {

  computed_data <- rnorm(1000)
  save(computed_data, file = "./Data/example_data.
} else {
```

```
  # Load the saved data
  load("./Data/example_data.Rdata")
}

#
head(computed_data)
```

```
[1]  2.1988103  1.3124130 -0.2651451  0.5431941 -0.4
```

E. eval: false

```
# This chunk will display the code
# but will not execute it
set.seed(123)
data <- rnorm(1000)
plot(density(data), main = "plot")
```

II. OTHER EXAMPLES: PLOT AND TABLE

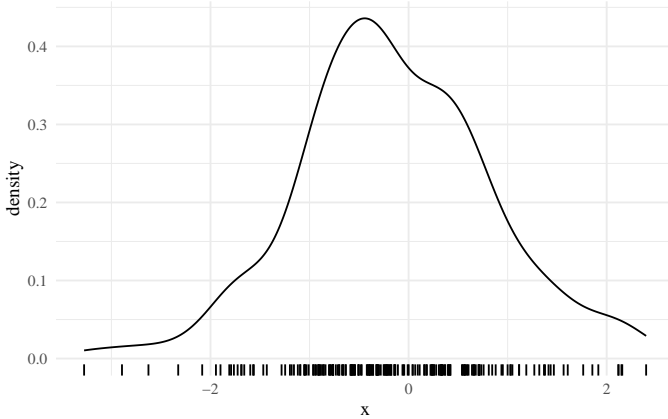In a famous paper, [1] introduced a family of transformations
...

Fig. 1: Simulated data from a N(0,1) distribution.

Fig. 1 shows a kernel density estimate of simulated data from a N(0,1) distribution. The sample variance is given by

$$s^2 = \frac{1}{n-1} \sum_{i=1}^{n} (x_i - \bar{x})^2 = 0.98. \tag{1}$$

Note that 1 is an unbiased estimate of the variance, but it is not the maximum likelihood estimate [2, p. 269].

In table I we have ...

Table I: Test accuracy and processing time for each bootstrap-improved estimator.

Estimator	L	n	$S(\boldsymbol{Z}; L)$	**Time** (s)
$\widetilde{H}_{AO}$	8	25	-0.06556	0.03
$\widetilde{H}_{AO}$	8	49	-0.00231	0.01

III. MARKDOWN BASICS

The reader can easily find many documentations on how to write using the (Pandoc/Quarto) Markdown syntax. The `quarto-ieee` template relies mainly on the Markdown markup supported by Quarto [3], which is build based on Pandoc [4], [5]. Below are some basic examples of usage of the Markdown markup (to save space, it is better to consult the original Quarto document `template.qmd`).

A. Figures

An image with nonempty alt text will be rendered as a figure with a caption with Pandoc and Quarto. Quarto includes a different features to simplify the use of figures and subfigures. Here, it is recommended to use div block with `#fig-` label to embed your Figures.

Fig. 2: An example of figure.
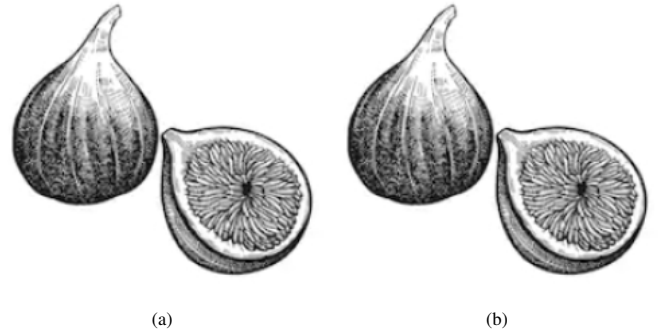

(a) (b)

Fig. 3: An example with sub-figure.

The figures is cross-referenced as Fig. 3 and even the sub-figures as Fig. 3b.

1) Tables: Similarly, many kind of tables may be used with Pandoc and Quarto. The latter also includes different features to simplify the table output. To make tables cross-referenceable use a label with a `#tbl-` prefix.

However, it is recommended to avoid using the commonly used single Markdown table known as a 'pipe table'. In fact, Pandoc Markdown uses the LaTeX `longtable` package, which does not support the two-column mode, which is required for most `IEEEtran` journals. `quarto-ieee` uses a hack to temporarily switch to one-column mode. However, this hack may break the page layout. To overcome this issue, a basic way is to use code cells (as for Table III). Quarto is a multi-language and it uses `Knitr` to execute `R` code and can execute Python code blocks within Markdown.

Table II: Main Caption

(a) First Table

Col1	Col2	Col3
A	B	C
E	F	G
A	G	G

(b) Second Table

Col1	Col2	Col3
A	B	C
E	F	G
A	G	G

The Tables are cross-referenced as Table II for details, especially Table IIb. There is also Table III.

Table III: A table

Col1	Col2	Col3
A	D	G
B	E	H
C	F	I

B. Bibliography

IEEE journal should normally use IEEEtran[1] BIBTEX style. Nevertheless, Pandoc and Quarto do support BIBTEX with natbib or biblatex. However, neither is officially recommended for normal IEEE use. For this reason, `quarto-ieee` uses `citeproc` with the `ieee` CSL style sheet.

IV. CONCLUSIONS

The conclusion goes here.

ACKNOWLEDGMENT

APPENDIX

AN APPENDIX

Use `[]{.appendix options="An Appendix"}` markup if you have a single appendix. `IEEEtran` state that to do not use `\section{}` anymore after `\appendix`.

REFERENCES

[1] G. E. P. Box and D. R. Cox, "An analysis of transformations," *Journal of the Royal Statistical Society, Series B*, vol. 26, no. 2, pp. 211–252, 1964.

[2] J. A. Rice, *Mathematical statistics and data analysis*, 3rd edition. Duxbury, 2007.

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[4] J. MacFarlane, A. Krewinkel, and J. Rosenthal, "Pandoc." [Online]. Available: https://github.com/jgm/pandoc

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[1] IEEEtran BibTeX style support page is: http://www.michaelshell.org/tex/ieeetran/bibtex/