

# Computo Journal Format

To be used as template for contribution to Computo

The Computo Team                      a friend

10/19/22

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# Introduction

## About this document

This document provides a template based on the [quarto system](#) for contributions to **Computo** (Computo Team 2021). We show how **Python** (Perez, Granger, and Hunter 2011) or **R** (R Core Team 2020) code can be included.

## Advice for writting your manuscript

First make sure that you are able to build your manuscript as a regular notebook on your system. Then you can start configure the binder environment.

## Formatting

This section covers basic formatting guidelines. [Quarto](#) is a versatile formatting system for authoring HTML based on markdown, integrating  $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$  and various code block interpreted either via Jupyter or Knitr (and thus deal with Python, R and many other langages). It relies on the [Pandoc Markdown](#) markup language.

### **i** Note

We will only give some formatting elements. Authors can refer to the [Quarto web page](#) for a complete view of formatting possibilities.

To render/compile a document, run `quarto render`. A document will be generated that includes both content as well as the output of any embedded code chunks within the document:

```
quarto render content.qmd # will render to html
```

## Basic markdown formatting

**Bold text** or *italic*

- This is a list
- With more elements
- It isn't numbered.

But we can also do a numbered list

1. This is my first item
2. This is my second item
3. This is my third item

## Mathematics

### Mathematical formulae

[L<sup>A</sup>T<sub>E</sub>X](#) code is natively supported<sup>1</sup>, which makes it possible to use mathematical formulae: will render

$$f(x_1, \dots, x_n; \mu, \sigma^2) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left(-\frac{1}{2\sigma^2} \sum_{i=1}^n (x_i - \mu)^2\right)$$

It is also possible to cross-reference an equation, see Equation 1:

$$\begin{aligned} D_{x_N} &= \frac{1}{2} \begin{bmatrix} x_L^\top & x_N^\top \end{bmatrix} \begin{bmatrix} L_L & B \\ B^\top & L_N \end{bmatrix} \begin{bmatrix} x_L \\ x_N \end{bmatrix} \\ &= \frac{1}{2} (x_L^\top L_L x_L + 2x_N^\top B^\top x_L + x_N^\top L_N x_N), \end{aligned} \tag{1}$$

### Theorems and other amsthm-like environments

Quarto includes a nice support for theorems, with predefined prefix labels for theorems, lemmas, proposition, etc. see [this page](#). Here is a simple example:

**Theorem 0.1** (Strong law of large numbers). *The sample average converges almost surely to the expected value:*

$$\overline{X}_n \xrightarrow{a.s.} \mu \quad \text{when } n \rightarrow \infty.$$

See Theorem [0.1](#).

---

<sup>1</sup>We use [katex](#) for this purpose.

## Code

Quarto uses either Jupyter or knitr to render code chunks. This can be triggered in the yaml header, e.g., for Jupyter (should be installed on your computer) use

```
---
title: "My Document"
author "Jane Doe"
jupyter: python3
---
```

For knitr (R + knitr must be installed on your computer)

```
---
title: "My Document"
author "Jane Doe"
---
```

You can use Jupyter for Python code and more. And R + Knitr for if you want to mix R with Python (via the package reticulate Ushey, Allaire, and Tang (2020)).

## R

R code (R Core Team 2020) chunks may be embedded as follows:

```
x <- rnorm(10)
```

## Python

```
import plotly.express as px
df = px.data.tips()
fig = px.histogram(df, x="total_bill", y="tip", color="sex",
                  marginal="box", # or violin, rug
                  hover_data=df.columns)
fig
```

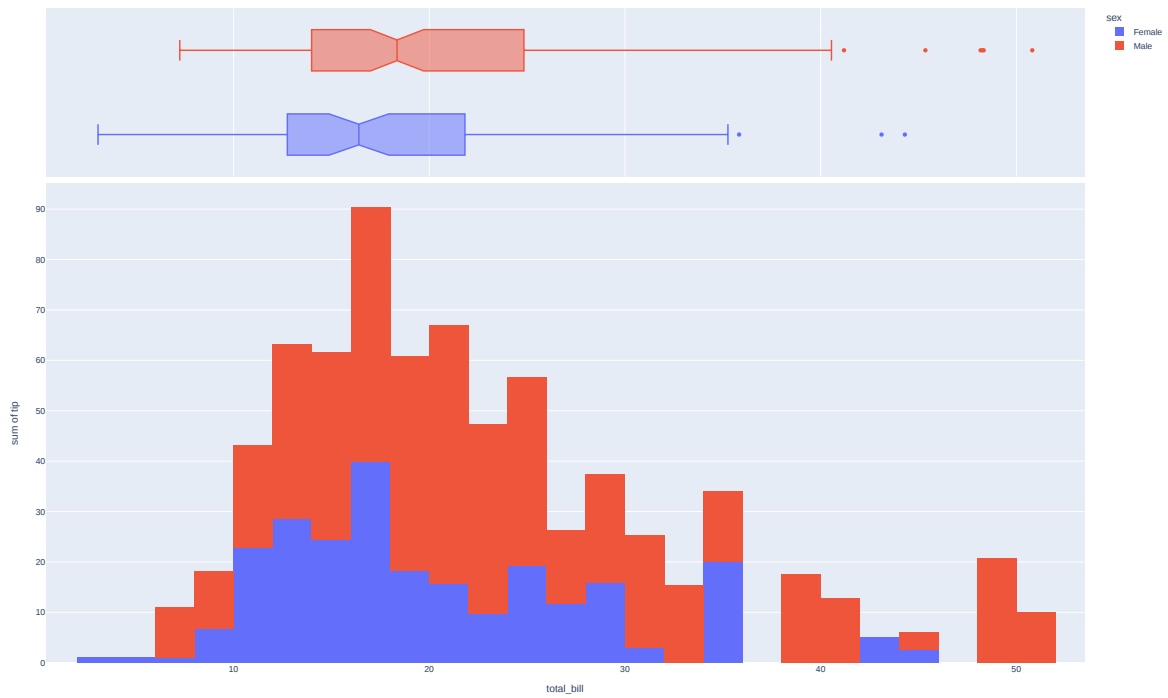


Figure 1: A simple python plotly example

## Figures

Plots can be generated as follows and referenced. See plot [Figure 2](#):

```
library("ggplot2")
p <- ggplot(mpg, aes(displ, hwy)) +
  geom_point() +
  geom_smooth() + theme_bw()
p
```

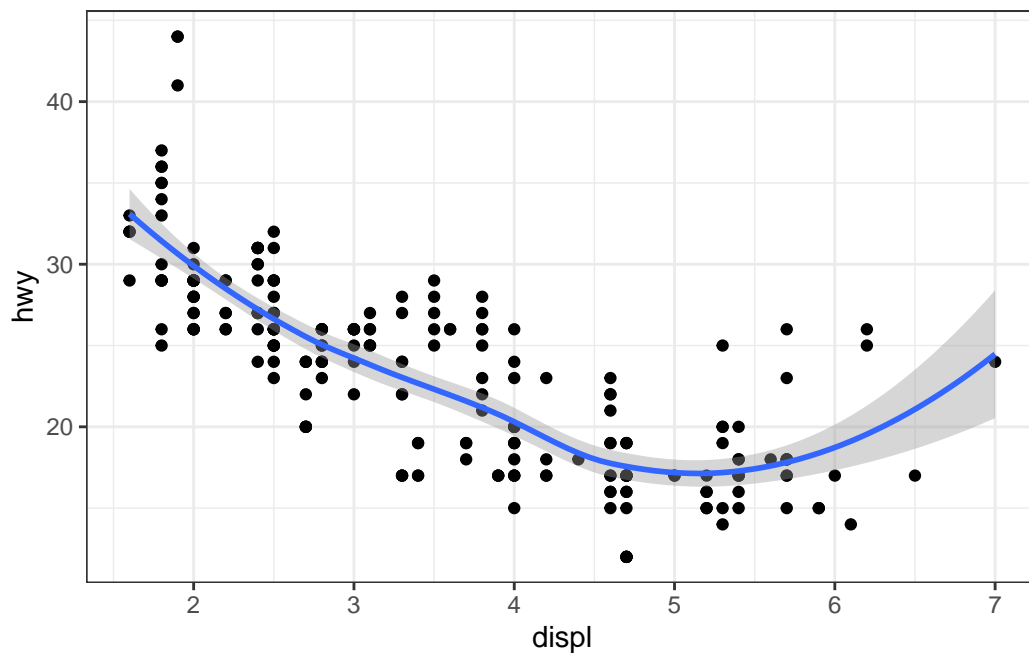


Figure 2: A simple ggplot example

Interactive plots may also be produced in the HTML output of the document:

It is also possible to create figures from static images:



Figure 3: SFdS logo (c.a. 2021)

## Tables

Tables (with label: `@tbl-mylabel` renders Table 1) can be generated with markdown as follows

Table 1: my table caption

Tables	Are	Cool
col 1 is	left-aligned	\$1600
col 2 is	centered	\$12
col 3 is	right-aligned	\$1

Table can also be generated by some code, for instance with knitr here:

```
knitr::kable(summary(cars), caption = "Table caption.")
```

Table 2: Table caption.

speed	dist
Min. : 4.0	Min. : 2.00
1st Qu.:12.0	1st Qu.: 26.00
Median :15.0	Median : 36.00
Mean :15.4	Mean : 42.98
3rd Qu.:19.0	3rd Qu.: 56.00
Max. :25.0	Max. :120.00

#### Note

Alternatively you may use the [list tables](#) format, easier to write and maintain:

```
:::list-table
* - row 1, column 1
  - row 1, column 2
  - row 1, column 3

* - row 2, column 1
  -
  - row 2, column 3

* - row 3, column 1
  - row 3, column 2
:::
```

row 1, column 1	row 1, column 2	row 1, column 3
row 2, column 1		row 2, column 3
row 3, column 1	row 3, column 2	

## Algorithms

A solution to typeset pseudocode just like you would do with  $\text{\LaTeX}$ , yet with HTML output is to rely on the JavaScript [pseudocode.js](#). Your pseudocode is written inside a [Code Block](#) with the `pseudocode` class. Do not forget the class tag, that will trigger the rendering process of your pseudo-code. The result is as follows<sup>2</sup>:

```
```.pseudocode
% This quicksort algorithm is extracted from Chapter 7, Introduction
% to Algorithms (3rd edition)
\begin{algorithm}
\caption{Quicksort}
\begin{algorithmic}
\Procedure{Quicksort}{$A, p, r$}
  \If{$p < r$}
    \State $q = $ \Call{Partition}{$A, p, r$}
    \State \Call{Quicksort}{$A, p, q - 1$}
    \State \Call{Quicksort}{$A, q + 1, r$}
  \EndIf
\EndProcedure
\Procedure{Partition}{$A, p, r$}
  \State $x = A[r]$
  \State $i = p - 1$
  \For{$j = p, \dots, r - 1$}
    \If{$A[j] < x$}
      \State $i = i + 1$
      \State exchange
        $A[i]$ with $A[j]$
    \EndIf
  \State exchange $A[i]$ with $A[r]$
\EndFor
\EndProcedure
\end{algorithmic}
\end{algorithm}
...

```

---

<sup>2</sup>For proper pdf rendering, use [Camel cased](#) names for all `algorithmic` keywords, not upper case ones like the examples in `pseudocode.js`'s documentation



---

**Algorithm 1** Quicksort

---

```
procedure QUICKSORT( $A, p, r$ )
  if  $p < r$  then
     $q = \text{PARTITION}(A, p, r)$ 
    QUICKSORT( $A, p, q - 1$ )
    QUICKSORT( $A, q + 1, r$ )
  procedure PARTITION( $A, p, r$ )
     $x = A[r]$ 
     $i = p - 1$ 
    for  $j = p, \dots, r - 1$  do
      if  $A[j] < x$  then
         $i = i + 1$ 
        exchange  $A[i]$  with  $A[j]$ 
    exchange  $A[i]$  with  $A[r]$ 
```

---

## Handling references

### Bibliographic references

References are displayed as footnotes using [BibTeX](#), e.g. `[@computo]` will be displayed as (Computo Team 2021), where `computo` is the bibtex key for this specific entry. The bibliographic information is automatically retrieved from the `.bib` file specified in the header of this document (here: `references.bib`).

### Other cross-references

As already (partially) seen, Quarto includes a mechanism similar to the bibliographic references for sections, equations, theorems, figures, lists, etc. Have a look at [this page](#).

## Bibliography

- Computo Team. 2021. “Computo: Reproducible Computational/Algorithmic Contributions in Statistics and Machine Learning.” *Computo*.
- Perez, Fernando, Brian E Granger, and John D Hunter. 2011. “Python: An Ecosystem for Scientific Computing.” *Computing in Science & Engineering* 13 (2): 13–21.
- R Core Team. 2020. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. <https://www.R-project.org/>.
- Ushey, Kevin, JJ Allaire, and Yuan Tang. 2020. *Reticulate: Interface to Python*. <https://github.com/rstudio/reticulate>.