ıplate for contribution to Computo

ɔle based on the Rmarkdown system

ıputo team

-09

ɔduction

ıt this document

ment provides a Rmarkdown[1] template for contributions to the **Computo** Journal. We show how R ı code can be included.

ves as a documentation for configuring the github repository which will host the Rmarkdown source ıanuscript and prove us the reproducibility of your work. To this end, we use binder to generate the ering of your manuscript both in HTML and PDF.

puto template

ɔns to Computo require both scientific content (typically equations, codes and figures) and a proof that ınt is reproducible. This is achieved via the standard notebook systems available for R, Python and ter notebook anbd Rmarkdown), coupled with the binder building system.

to submission is thus a git(hub) repository typically containing

source of the notebook, which may be a Rmarkdown document (such as the present document) or a ɾter notebook + Myst **link to other templates when available**);
ıliary files, e.g.:
  › a BibTeX file (e.g. `./template-computo-Rmarkdown.bib`)
  › some static figures in the `figs/` subdirectory (e.g. `figs/picture.png`)
figuration files for the binder environment to setup the machine that will build the final notebook file ٨L and/or PDF)

ɪnt document explains how to:

mat a notebook with Rmarkdown
tionally) configure the binder environment

iled notebook (pdf file) will be generated directly in the github repository (via a github action), ready
mitted to the Computo submission platform (https://computo.scholasticahq.com/).

e in writting your manuscript

e sure that you are able to build your manuscript as a regular notebook on your system. Then you can
igure the binder environment (which we configure to use an Ubuntu machine with latest LTS release).

nating the notebook

on is about writing a notebook with the Rmarkdown system, typically for R users.

rkdown basics

uickly cover the most basic features of Rmarkdown, that is, formatting text with markdown, math
$\not{X}$ via MathJax and bibliographical references via $BibT_EX$.

wn (http://rmarkdown.rstudio.com) is a simple formatting system for authoring HTML and PDF
ts, that relies on the markdown markup language.

the document as HTML within Rstudio, click the **Knit** button. A document will be generated that
both content as well as the output of any embedded R code chunks within the document.
ely, the shortcut Ctrl + Maj + K will produces the same result.

matical formulae

ode is natively supported, which makes it possible to use mathematical formulae:

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

nces

es are displayed as footnotes using bibtex, e.g. `[@computo]` will display as (Computo Team 2020),
mputo is the bibtex key for this entry. The bibliographic information is automatically retrieved from
file specified in the header of this document (here: `template-computo-Rmarkdown.bib`).

de

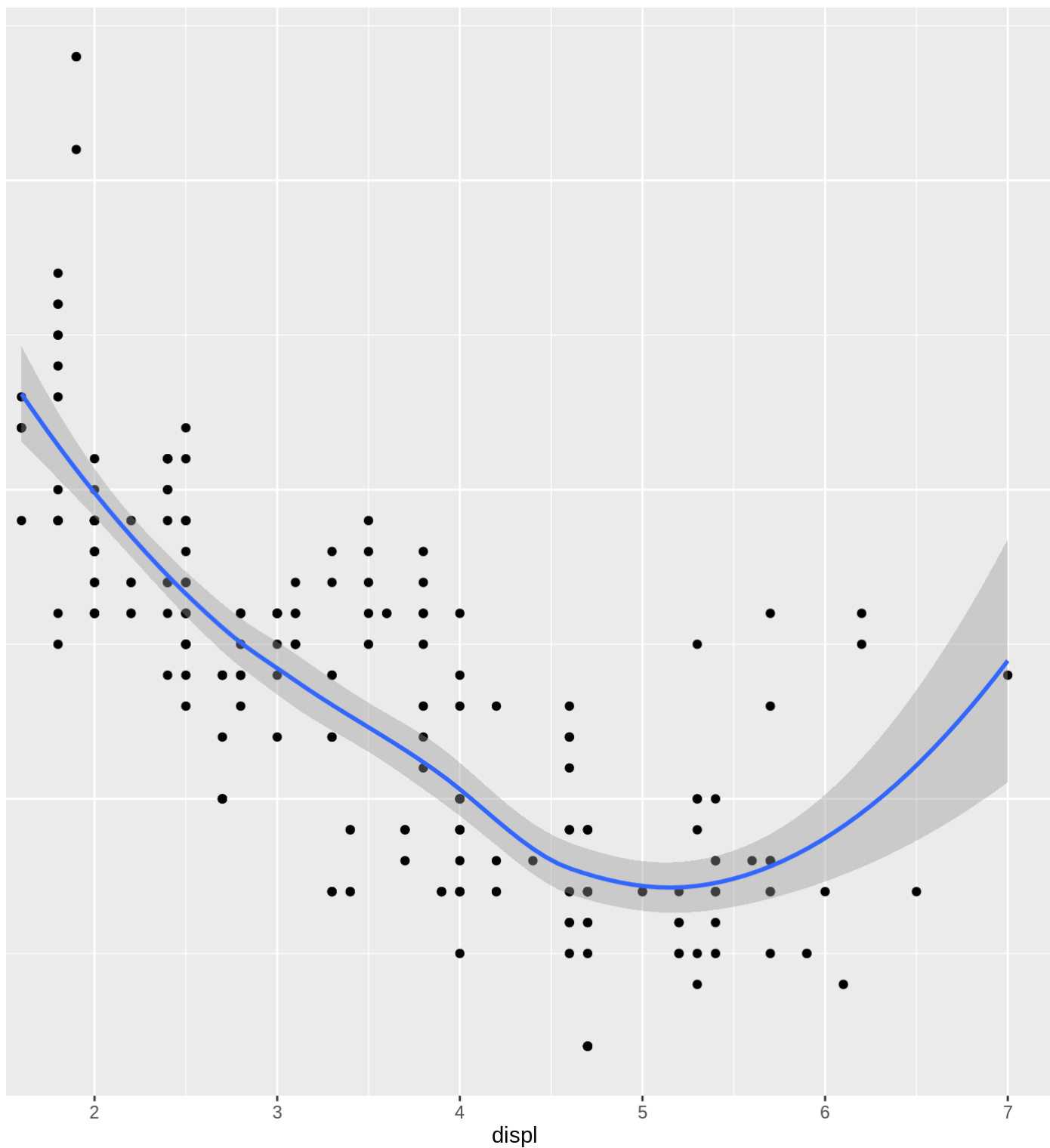R Core Team 2020) chunks may be embedded as follows:

```
kable(summary(cars))
```

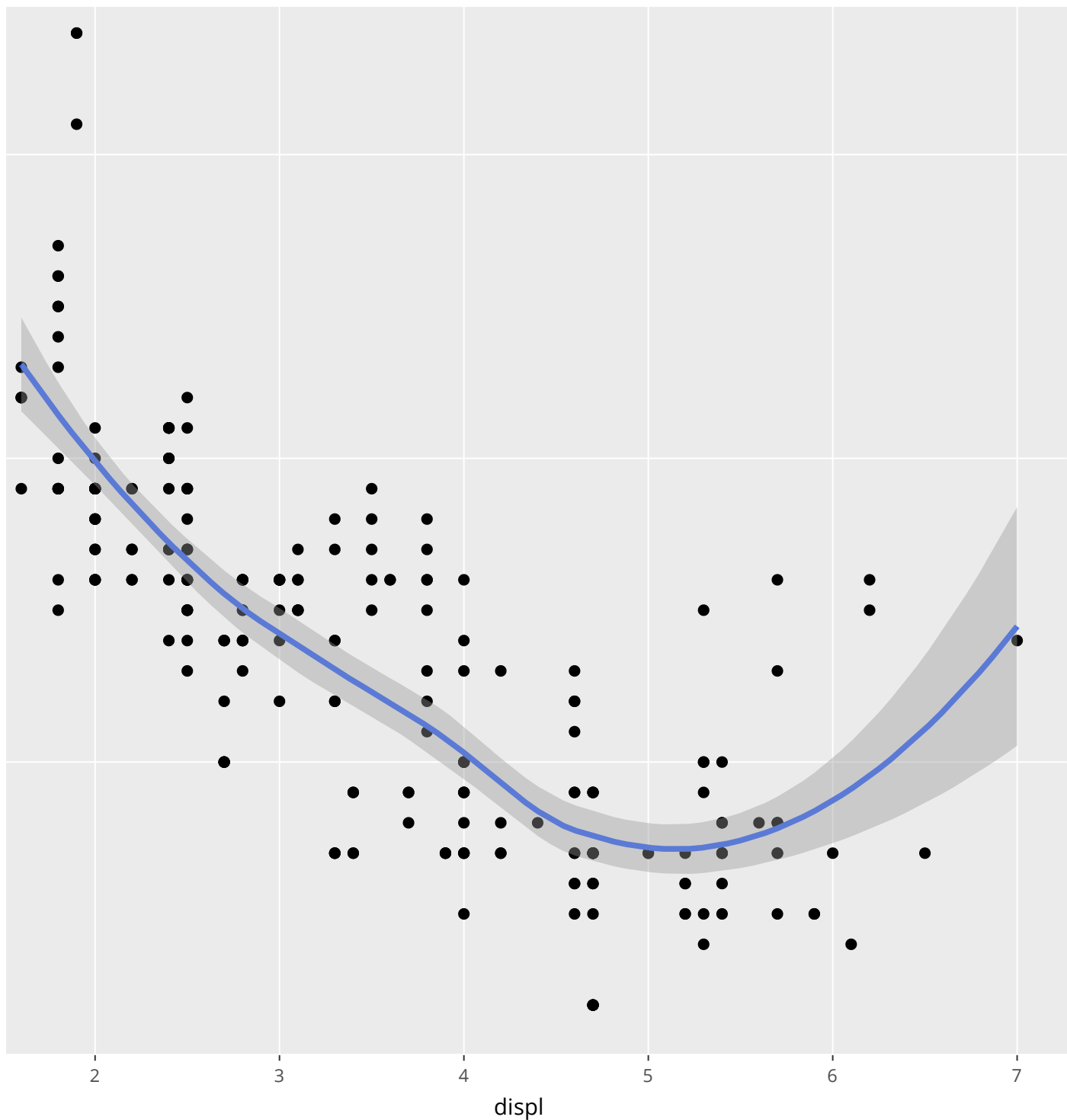| ed	dist
.. : 4.0	Min. : 2.00
Qu.:12.0	1st Qu.: 26.00
dian :15.0	Median : 36.00
an :15.4	Mean : 42.98
Qu.:19.0	3rd Qu.: 56.00
x. :25.0	Max. :120.00

ing Plots

be generated as:

```
om_smooth()` using method = 'loess' and formula 'y ~ x'
```

the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that
l the plot.

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

```
/("plotly")
ly(p)
```

on Code

kage reticulate (https://cran.r-project.org/package=reticulate) (Ushey, Allaire, and Tang 2020) includes
engine for R Markdown that enables easy interoperability between Python and R chunks. Below we
ate a small subset of the available functionalities. We refer to the vignette R Markdown Python Engine
ran.r-project.org/web/packages/reticulate/vignettes/r_markdown.html) for a more detailed
on.

```
/("reticulate")
-tualenv("computo-template")
```

e sure (here, in `R`) that the required python modules are available

```
/_module_available("seaborn")) py_install("seaborn")
/_module_available("pandas")) py_install("pandas")
/_module_available("matplotlib")) py_install("matplotlib")
```

python

of python code and associated output:
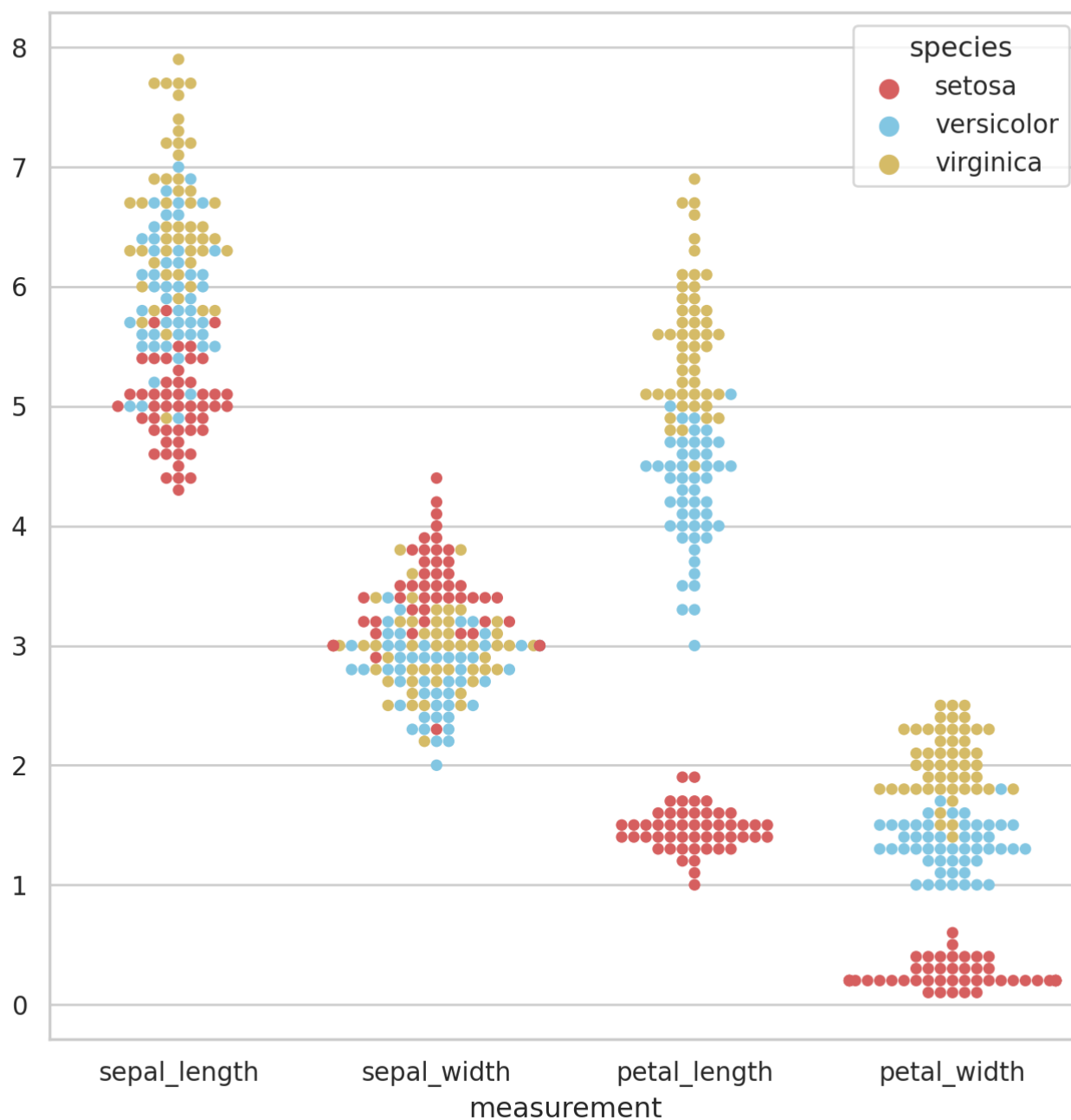
```
pandas as pd
seaborn as sns
matplotlib.pyplot as plt

:(style="whitegrid", palette="muted")

the example iris dataset
sns.load_dataset("iris")

:" the dataset to "long-form" or "tidy" representation
pd.melt(iris, "species", var_name="measurement")
jure()

a categorical scatterplot to show each observation
armplot(x="measurement", y="value", hue="species", palette=["r", "c", "y"], data=i
  ris)
ɔw()
```

munication between R and python chunks

s created within Python chunks are available to R using the `py` object exported by the reticulate
e.g.:

```
wn::paged_table(py$iris)
```

measurement <chr>	value <dbl>
sepal_length	5.1
sepal_length	4.9
sepal_length	4.7
sepal_length	4.6
sepal_length	5.0
sepal_length	5.4
sepal_length	4.6
sepal_length	5.0
sepal_length	4.4
sepal_length	4.9

500 rows   Previous **1** 2 3 4 5 6 ... 60 Next

ly, all objects created within R are available from Python using the `r` object exported by the

is create an object within R:

```
olcano)
```

```
wn::paged_table(as.data.frame(volcano))
```

/1 l>	V2 <dbl>	V3 <dbl>	V4 <dbl>	V5 <dbl>	V6 <dbl>	V7 <dbl>	V8 <dbl>	V9 <dbl>	V10 <dbl>	▶
)0	100	101	101	101	101	101	100	100	100	
)1	101	102	102	102	102	102	101	101	101	
)2	102	103	103	103	103	103	102	102	102	
)3	103	104	104	104	104	104	103	103	103	
)4	104	105	105	105	105	105	104	104	103	
)5	105	105	106	106	106	106	105	105	104	
)5	106	106	107	107	107	107	106	106	105	
)6	107	107	108	108	108	108	107	107	106	
)7	108	108	109	109	109	109	108	108	107	
)8	109	109	110	110	110	110	109	109	108	

37 rows | 1-10 of 61 columns   Previous **1** 2 3 4 5 6 ... 9 Next

ct is accessible from Python:

```
r.volcano)
```

```
00. 100. 101. ... 104. 104. 103.]
01. 101. 102. ... 105. 104. 104.]
02. 102. 103. ... 105. 105. 104.]

98.  98.  98. ...  94.  94.  94.]
97.  98.  98. ...  94.  94.  94.]
97.  97.  97. ...  94.  94.  94.]]
```

r languages

ally, you can include many others languages into Rmarkdown including Julia and C++. If you are
ble enough to configure binder and prove us the reproducibility of your code, feel free to use any
guage.

figuring binder

binder setup

m libraries

ckages

nent.yml for packages available in conda, or `install.R` for other packages (including git(hub)
available via `remotes` or Bioconductor packages availabl via `BiocManager`).

ling

ommit which include de string "do_build" in its message. (try to lower the footprint…)

sion information

```
nInfo()
```

```
ersion 4.0.3 (2020-10-10)
form: x86_64-conda-linux-gnu (64-bit)
ing under: Ubuntu 20.04.2 LTS

ix products: default
S/LAPACK: /usr/share/miniconda/envs/computorbuild/lib/libopenblasp-r0.3.12.so

ale:
| LC_CTYPE=en_US.UTF-8        LC_NUMERIC=C
| LC_TIME=en_US.UTF-8         LC_COLLATE=en_US.UTF-8
| LC_MONETARY=en_US.UTF-8     LC_MESSAGES=en_US.UTF-8
| LC_PAPER=en_US.UTF-8        LC_NAME=C
| LC_ADDRESS=C                LC_TELEPHONE=C
| LC_MEASUREMENT=en_US.UTF-8 LC_IDENTIFICATION=C

ached base packages:
 stats     graphics  grDevices utils     datasets  methods   base

r attached packages:
 reticulate_1.18 plotly_4.9.3    ggplot2_3.3.3

led via a namespace (and not attached):
| tidyselect_1.1.0  xfun_0.20         purrr_0.3.4       splines_4.0.3
| lattice_0.20-41   colorspace_2.0-0  vctrs_0.3.6       generics_0.1.0
| htmltools_0.5.1.1 viridisLite_0.3.0 yaml_2.2.1        mgcv_1.8-34
| utf8_1.1.4        rlang_0.4.10      pillar_1.5.1      glue_1.4.2
| withr_2.4.1       DBI_1.1.1         rappdirs_0.3.3    lifecycle_1.0.0
| stringr_1.4.0     munsell_0.5.0     gtable_0.3.0      htmlwidgets_1.5.3
| evaluate_0.14     labeling_0.4.2    knitr_1.31        crosstalk_1.1.1
| fansi_0.4.2       highr_0.8         Rcpp_1.0.6        scales_1.1.1
| jsonlite_1.7.2    farver_2.1.0      digest_0.6.27     stringi_1.5.3
| dplyr_1.0.5       grid_4.0.3        tools_4.0.3       magrittr_2.0.1
| lazyeval_0.2.2    tibble_3.1.0      crayon_1.4.1      tidyr_1.1.3
| pkgconfig_2.0.3   ellipsis_0.3.1    Matrix_1.3-2      data.table_1.14.0
| assertthat_0.2.1  rmarkdown_2.7     httr_1.4.2        R6_2.5.0
| nlme_3.1-152      compiler_4.0.3
```

rences

Team. 2020. "Computo: Reproducible Computational/Algorithmic Contributions in Statistics and
ne Learning."
am. 2020. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for
ical Computing. https://www.R-project.org/ (https://www.R-project.org/).
vin, JJ Allaire, and Yuan Tang. 2020. *Reticulate: Interface to Python*.
/github.com/rstudio/reticulate (https://github.com/rstudio/reticulate).

s://rmarkdown.rstudio.com/ (https://rmarkdown.rstudio.com/)↵