



e-Rum2020

VIRTUAL CONFERENCE

17/20 JUNE
MILANO

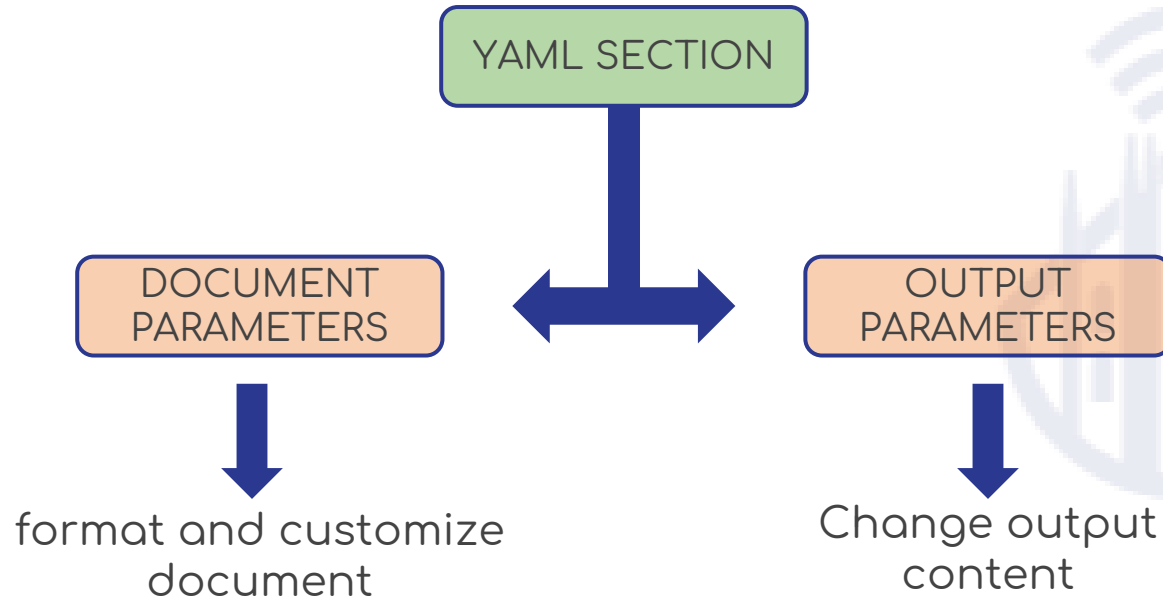
Cristina Muschitiello
Niccolò Stamboglis

03_Parametrization

A UNIFIED APPROACH FOR WRITING AUTOMATIC REPORTS

Parameterization and Generalization of R- Markdown

Parametrization: 2 tipologies



1. DOCUMENT PARAMETERS (and sub-parameters)

Indentation matters:

Not working



```
1 ---
2 title: "My First Markdown"
3 output:
4   html_document:
5     number_sections: true
6   toc: true
7   toc_depth: 3
8   toc_float: false
9 author: "Nick Stamboglis"
10 date: "`r format(Sys.time(), '%e %B %Y')`"
11 link-citations: yes
12 ---
```

Working



```
1 ---
2 title: "My First Markdown"
3 output:
4   html_document:
5     number_sections: true
6   toc: true
7   toc_depth: 3
8   toc_float: false|
9 author: "Nick Stamboglis"
10 date: "`r format(Sys.time(), '%e %B %Y')`"
11 link-citations: yes
12 ---
```

1. DOCUMENT PARAMETERS

A Stylish Rmarkdown

```
1 ---
2 title: "My First Markdown"
3 output:
4   html document:
5     theme: cerulean
6     number_sections: true
7     toc: true
8     toc_depth: 3
9     toc_float: true
10    collapse: true
11    smooth scroll: true
12 author: "Nick Stamboglis"
13 date: "`r format(Sys.time(), '%e %B %Y')`"
14 link-citations: yes
15 ---
```

Themes: <https://www.datadreaming.org/post/r-markdown-theme-gallery/>

Section numbering

Table of contents

R Code

Link to bibliography

1. DOCUMENT PARAMETERS

Prettydoc styles

Cayman (Demo Page)

Creating Pretty Documents From R Markdown

The Cayman Theme

The `prettydoc` package provides an alternative engine, `htai_pretty`, to knit your R Markdown document into pretty HTML pages. Its usage is extremely easy: simply replace the `markdown::htai_document` or `markdown::htai_vignette` output engine by `prettydoc::htai_pretty` in your R Markdown header, and use one of the built-in themes and syntax highlighters.

Elements

We demonstrate some commonly used HTML elements here to show the appearance of themes.

Tables

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Block	5	343.3	68.66	4.288	0.01272
N	1	189.3	189.28	11.821	0.00366
P	1	8.4	8.40	0.525	0.47999
K	1	95.2	95.20	5.946	0.02767
Residuals	15	240.2	16.01		

Code

Familiar knitr R code and plots:

```
set.seed(123)
n <- 1000
x1 <- matrix(rnorm(n), ncol = 2)
x2 <- matrix(rnorm(n, mean = 3, sd = 1.5), ncol = 2)
x <- rbind(x1, x2)
par(mfrow = c(4, 4, 1, 2))
smoothScatter(x, slabel = "x1", ylab = "x2")
```

Tactile (Demo Page)

Creating Pretty Documents From R Markdown

The Tactile Theme

The `prettydoc` package provides an alternative engine, `htai_pretty`, to knit your R Markdown document into pretty HTML pages. Its usage is extremely easy: simply replace the `markdown::htai_document` or `markdown::htai_vignette` output engine by `prettydoc::htai_pretty` in your R Markdown header, and use one of the built-in themes and syntax highlighters.

Elements

We demonstrate some commonly used HTML elements here to show the appearance of themes.

Tables

	Df	Sum Sq	Mean Sq	F value
Block	5	343.3	68.66	4.288
N	1	189.3	189.28	11.821
P	1	8.4	8.40	0.525
K	1	95.2	95.20	5.946
Residuals	15	240.2	16.01	

Code

Familiar knitr R code and plots:

```
set.seed(123)
n <- 1000
x1 <- matrix(rnorm(n), ncol = 2)
x2 <- matrix(rnorm(n, mean = 3, sd = 1.5), ncol = 2)
x <- rbind(x1, x2)
par(mfrow = c(4, 4, 1, 2))
smoothScatter(x, slabel = "x1", ylab = "x2")
```

Architect (Demo Page)

Creating Pretty Documents From R Markdown

The Architect Theme

The `prettydoc` package provides an alternative engine, `htai_pretty`, to knit your R Markdown document into pretty HTML pages. Its usage is extremely easy: simply replace the `markdown::htai_document` or `markdown::htai_vignette` output engine by `prettydoc::htai_pretty` in your R Markdown header, and use one of the built-in themes and syntax highlighters.

Elements

We demonstrate some commonly used HTML elements here to show the appearance of themes.

Tables

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Block	5	343.3	68.66	4.288	0.01272 *
N	1	189.3	189.28	11.821	0.00366 **
P	1	8.4	8.40	0.525	0.47999
K	1	95.2	95.20	5.946	0.02767 *
Residuals	15	240.2	16.01		

Code

Familiar knitr R code and plots:

```
set.seed(123)
n <- 1000
x1 <- matrix(rnorm(n), ncol = 2)
x2 <- matrix(rnorm(n, mean = 3, sd = 1.5), ncol = 2)
x <- rbind(x1, x2)
par(mfrow = c(4, 4, 1, 2))
smoothScatter(x, slabel = "x1", ylab = "x2")
```

Leonids (Demo Page)

Creating Pretty Documents From R Markdown

THE LEONIDS THEME

The `prettydoc` package provides an alternative engine, `htai_pretty`, to knit your R Markdown document into pretty HTML pages. Its usage is extremely easy: simply replace the `markdown::htai_document` or `markdown::htai_vignette` output engine by `prettydoc::htai_pretty` in your R Markdown header, and use one of the built-in themes and syntax highlighters.

Elements

We demonstrate some commonly used HTML elements here to show the appearance of themes.

Tables

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Block	5	343.3	68.66	4.287	0.01270
N	1	189.3	189.28	12.259	0.0043
P	1	8.40	8.544	0.4799	0.4799
K	1	95.20	6.166	0.0288	
Residuals	15	21.28	1.378	0.2631	
	1	33.14	2.146	0.1686	
	5	0.48	0.091	0.8627	
	15.3	15.44			

HPSTR (Demo Page)

Creating Pretty Documents From R Markdown

THE HPSTR THEME

The `prettydoc` package provides an alternative engine, `htai_pretty`, to knit your R Markdown document into pretty HTML pages. Its usage is extremely easy: simply replace the `markdown::htai_document` or `markdown::htai_vignette` output engine by `prettydoc::htai_pretty` in your R Markdown header, and use one of the built-in themes and syntax highlighters.

Elements

We demonstrate some commonly used HTML elements here to show the appearance of themes.

Tables

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Block	5	343.3	68.66	4.447	0.01594 *
N	1	189.3	189.28	12.259	0.00437 **
P	1	8.4	8.40	0.544	0.47490
K	1	95.2	95.20	6.166	0.02880 *
N/P	1	21.3	21.28	1.378	0.26317
N/K	1	33.1	33.14	2.146	0.16865
P/K	1	0.5	0.48	0.091	0.86275
Residuals	12	185.3	15.44		

Code

Familiar knitr R code and plots:

```
set.seed(123)
n <- 1000
x1 <- matrix(rnorm(n), ncol = 2)
x2 <- matrix(rnorm(n, mean = 3, sd = 1.5), ncol = 2)
x <- rbind(x1, x2)
par(mfrow = c(4, 4, 1, 2))
smoothScatter(x, slabel = "x1", ylab = "x2")
```

Sources:
<https://prettydoc.statr.me/themes.html>

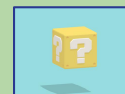
Your turn: Exercise 4



E04_document_parameters.Rmd

1. Add a floating toc
2. Add numbered sections
3. Change theme

```
1 ---  
2 title: "Working with document parameters"  
3 output:  
4   html_document:  
5     theme: cerulean  
6     number_sections: true  
7     toc: true  
8 author: "Nick Stamboglis"  
9 date: "`r format(Sys.time(), '%e %B %Y')`"  
10 ---
```



Time: 5 min

2. OUTPUT PARAMETERS

- Make the document parameter-dependent
- Replicate the analysis for a specific value of the parameters

define:


```
1 ---
2 title: "Working with document parameters"
3 output: html_document
4 author: "Cristina Muschitiello"
5 date: "`r format(Sys.time(), '%e %B %Y')`"
6 params:
7   month: "June"
8   year: 2020
9   name: "Cristina"
10  sequence: 100
11 ---
```



Use:

```
`r params$name`
`r params$month`
`r params$year`
```

Your turn: Exercise 5

 E05_output_parameters.Rmd

Change your welcome message

```
18 ## Welcome message|
19
20 Hi everybody!
21
22 I'm **`r params$name`** and this report was created in ***`r params$month` `r params$year`***
23
```

Welcome Message

Hi everybody!

I'm **Cristina** and this report was created in *May 2020*



2. OUTPUT PARAMETERS: Why?

Useful if you need to run

- Report for a specific customer
- Report for a specific section of your data

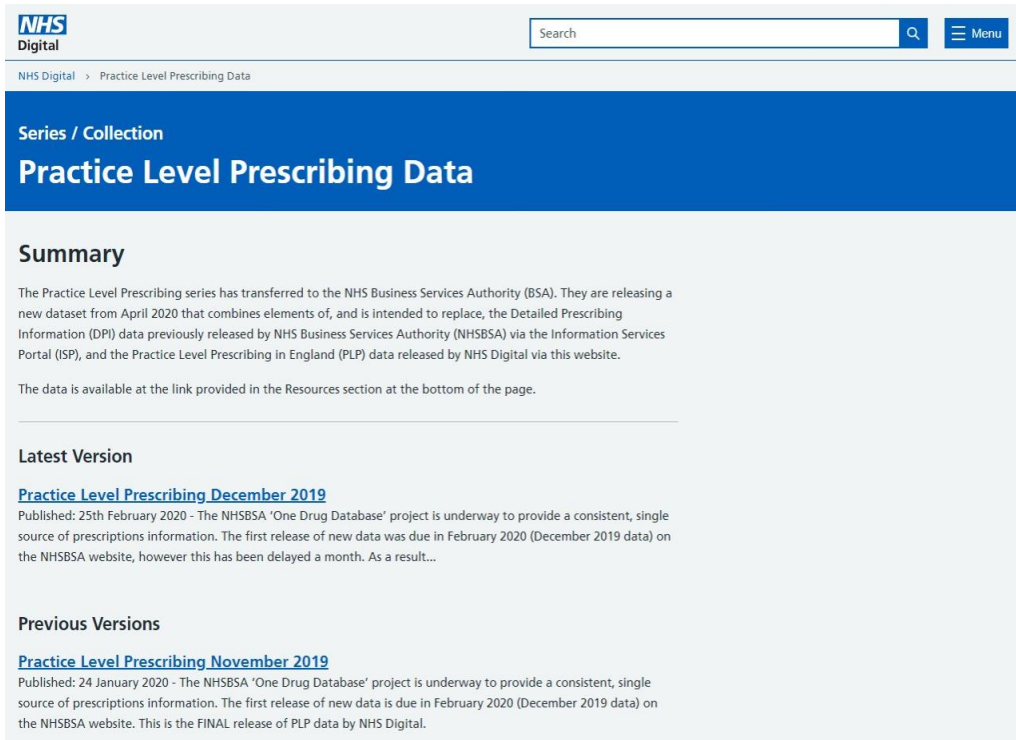
In general useful for ***reproducibility***



2. OUTPUT PARAMETERS: Reproducibility



First-up though: a real-world example



The screenshot shows the NHS Digital website interface. At the top, there is a search bar and a menu icon. Below the header, the breadcrumb trail reads "NHS Digital > Practice Level Prescribing Data". The main heading is "Series / Collection Practice Level Prescribing Data". Under the "Summary" section, it states that the Practice Level Prescribing series has transferred to the NHS Business Services Authority (BSA) and is intended to replace the Detailed Prescribing Information (DPI) data. It also mentions that the data is available at the link provided in the Resources section. The "Latest Version" section highlights the "Practice Level Prescribing December 2019" release, published on 25th February 2020, which is part of the NHSBSA 'One Drug Database' project. The "Previous Versions" section mentions the "Practice Level Prescribing November 2019" release, published on 24 January 2020, which is the final release of PLP data by NHS Digital.

NHS Digital > Practice Level Prescribing Data

Series / Collection

Practice Level Prescribing Data

Summary

The Practice Level Prescribing series has transferred to the NHS Business Services Authority (BSA). They are releasing a new dataset from April 2020 that combines elements of, and is intended to replace, the Detailed Prescribing Information (DPI) data previously released by NHS Business Services Authority (NHSBSA) via the Information Services Portal (ISP), and the Practice Level Prescribing in England (PLP) data released by NHS Digital via this website.

The data is available at the link provided in the Resources section at the bottom of the page.

Latest Version

[Practice Level Prescribing December 2019](#)
Published: 25th February 2020 - The NHSBSA 'One Drug Database' project is underway to provide a consistent, single source of prescriptions information. The first release of new data was due in February 2020 (December 2019 data) on the NHSBSA website, however this has been delayed a month. As a result...

Previous Versions

[Practice Level Prescribing November 2019](#)
Published: 24 January 2020 - The NHSBSA 'One Drug Database' project is underway to provide a consistent, single source of prescriptions information. The first release of new data is due in February 2020 (December 2019 data) on the NHSBSA website. This is the FINAL release of PLP data by NHS Digital.

- English NHS Open Data
- Single GP Prescriptions
- Rich Monthly Data (>1.5Gb)
- From Sept. 2011

In practice:

	A	B	C	D	E	F	G	H	I	J
1	SHA	PCT	PRACTICE	BNF CODE	BNF NAME	ITEMS	NIC	ACT COST	QUANTITY	PERIOD
2	Q44	RTV	Y04937	0304010W0BBABAL	Phenergan_Tab 25mg	3	8,15	7,89	98	201801
3	Q44	RTV	Y04937	0401010Z0AAAAAA	Zopiclone_Tab 7,5mg	7	2,88	3,35	98	201801
4	Q44	RTV	Y04937	0401020K0AAAHAH	Diazepam_Tab 2mg	5	3,76	3,94	191	201801
5	Q44	RTV	Y04937	0402010ABAAAVAV	Quetiapine_Tab 50mg M/R	1	31,6	29,37	28	201801
6	Q44	RTV	Y04937	0402010ADAAAAAA	Aripiprazole_Tab 10mg	3	13,6	12,88	63	201801
7	Q44	RTV	Y04937	0402010ADAAADAD	Aripiprazole_Tab 5mg	1	1,36	1,37	7	201801
8	Q44	RTV	Y04937	0402010S0AAADAD	Promazine HCl_Oral Soln 25mg/5ml	2	26	24,14	300	201801
9	Q44	RTV	Y04937	040201030AAABAB	Risperidone_Tab 2mg	1	0,15	0,25	7	201801
10	Q44	RTV	Y04937	040201030AAACAC	Risperidone_Tab 3mg	1	0,36	0,45	14	201801
11	Q44	RTV	Y04937	040201060AAALAL	Olanzapine_Tab 15mg	1	13,2	12,33	14	201801
12	Q44	RTV	Y04937	0403010R0AAAAAA	Lofepamine HCl_Tab 70mg	1	4,69	4,46	28	201801
13	Q44	RTV	Y04937	0403010X0AAABAB	Trazodone HCl_Cap 100mg	1	3,75	3,59	28	201801
14	Q44	RTV	Y04937	0403010X0AADAD	Trazodone HCl_Tab 150mg	1	7,54	7	28	201801
15	Q44	RTV	Y04937	0403030E0AAAAAA	Fluoxetine HCl_Cap 20mg	1	0,35	0,44	14	201801

Presentation level -> data is provided at the level of each individual drug name

Granularity -> GP practice (no individual prescription).

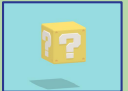
Identifiable data -> No.

Your turn: Exercise 6

 E06_England_Report.Rmd

- Knit the Rmd to see its content
- Then change *year*, *month* and *executor* parameters to see what changes

```
1 ---  
2 title: "***England report***"  
3 output:  
4   html_document:  
5     theme: cerulean  
6 params:  
7   month: 4  
8   year: 2019  
9   executor: "Cristina Muschitiello"  
10 ---
```




Time: 5 min

Changing parameters

Parameters could be useful to run your analysis on a specific subset of your dataset (in our case a practice).

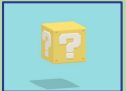


Your turn: Exercise 7

 E07_GP_report.Rmd

- Knit the Rmd to see its content
- Then change parameters and see how different GPs behave in different months

```
1 ---  
2 title: "**Practice reports**"  
3 output:  
4   html_document:  
5     theme: cerulean  
6 params:  
7   month: "05"  
8   year: 2019  
9   gp: "A81005"  
10 ---
```



Time: 5 min

Changing parameters

Parameters can also be useful to parametrize reports on specific quantitative thresholds (in our case a threshold on prescription rates).

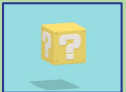


Your turn: Exercise 8

 E08_High_prescribing_report.Rmd

- Knit the Rmd to see its content
- Then change the threshold to see how High prescribing GPs behave

```
1 ---  
2 title: "***High Prescribing GPs report***"  
3 output:  
4   html_document:  
5     theme: cerulean  
6 params:  
7   month: "07"  
8   year: 2019  
9   threshold: 10  
10 ---
```



Time: 5 min

Questions



Next up: Generalizability



Source: giphy.com