

Training on Web Scraping Prices for CPI

Reproducible Analytical Pipelines

Christophe Bontemps & Serge Goussev



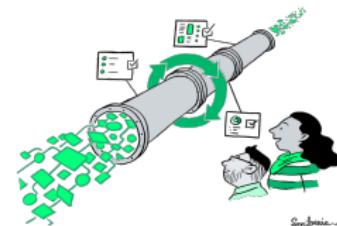
WHY ARE REPRODUCIBLE ANALYTICAL PIPELINES GOOD FOR YOU?

- ▶ It will make your (and your team's) *(working)* life easier.



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- ▶ It makes it easy to efficiently collaborate



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- ▶ It is an efficient way to work
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- ▶ It helps make the process of making official statistics more robust!
- ▶ It makes it easy to efficiently collaborate
- ▶ It will enhance your skills (and perhaps make you famous in your organization!)



Motivation



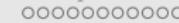
Issues



RAP



Principles



Version Control



Takeaways

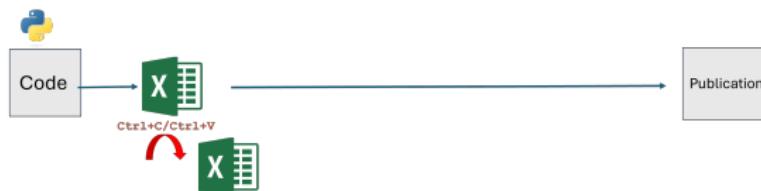


Resources



USUAL PRACTICE: THEORY VS REALITY

USUAL PRACTICE: THEORY VS REALITY



Send that file by email to your collaborators.

USUAL PRACTICE: THEORY VS REALITY



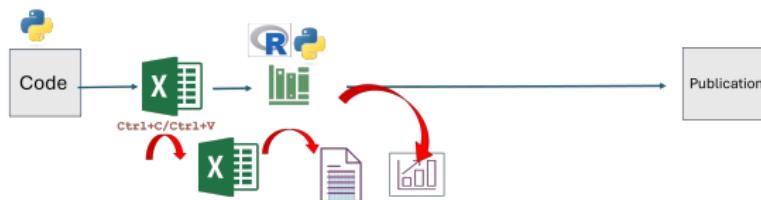
Someone in your team can start writing some insights.

USUAL PRACTICE: THEORY VS REALITY



You, or someone else, start an analysis ...

USUAL PRACTICE: THEORY VS REALITY



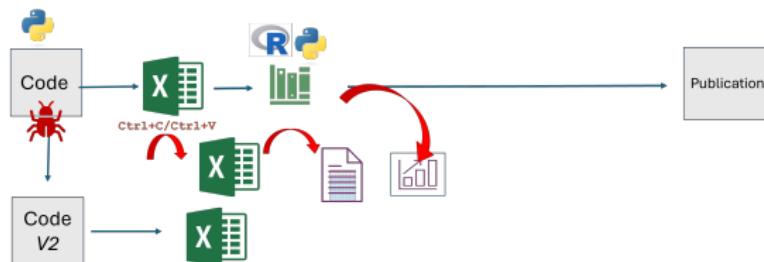
... producing some outputs (graphics, tables, etc..)

USUAL PRACTICE: THEORY VS REALITY



But wait... Oh no! There's a bug in the code!

USUAL PRACTICE: THEORY VS REALITY



So here is version 2, and another Excel file

USUAL PRACTICE: THEORY VS REALITY



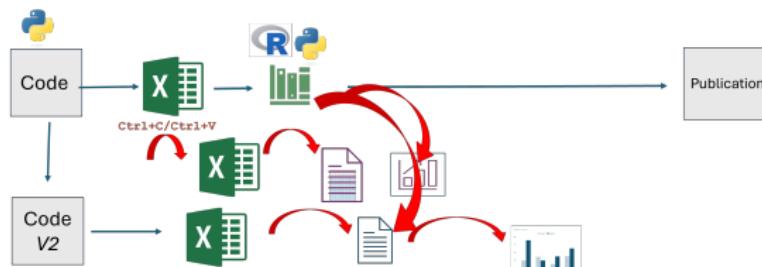
And new insights ...

USUAL PRACTICE: THEORY VS REALITY



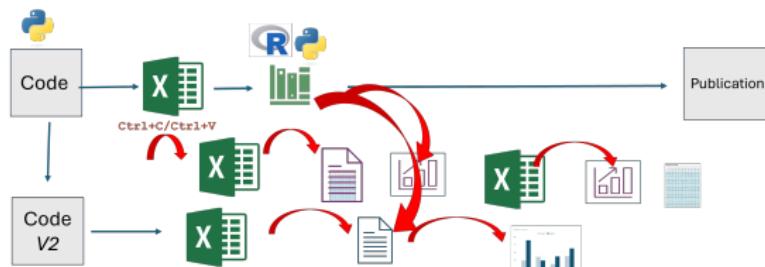
..and a new analysis based on the second Excell file

USUAL PRACTICE: THEORY VS REALITY



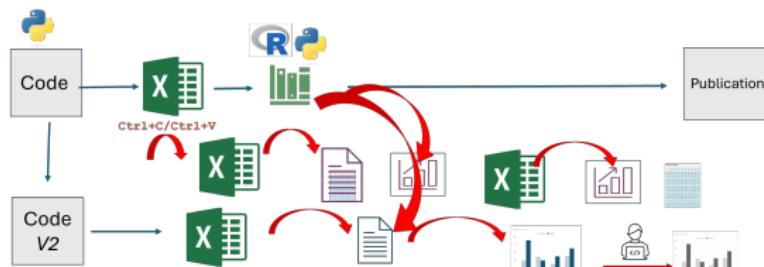
And new outputs, new graphics, etc.

USUAL PRACTICE: THEORY VS REALITY



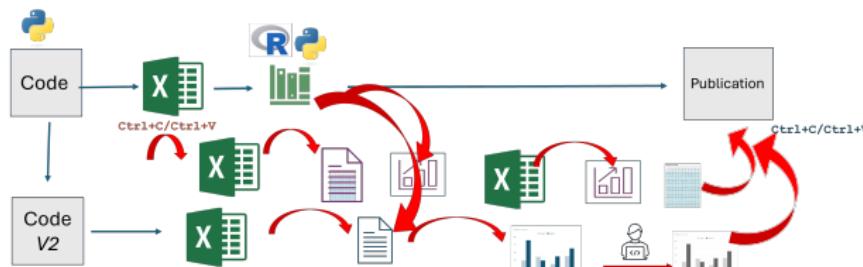
Also, using other data sets (classifications, scanner data)

USUAL PRACTICE: THEORY VS REALITY



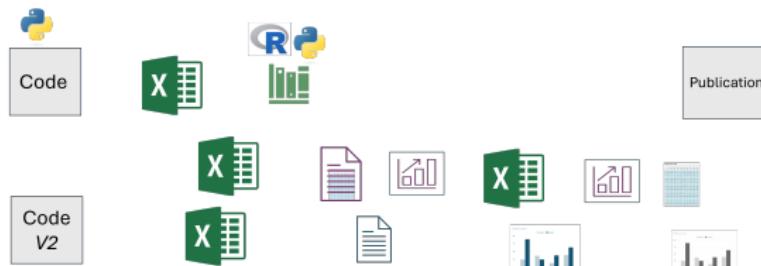
Maybe someone adapts graphics to NSO reports style

USUAL PRACTICE: THEORY VS REALITY



Finally, copy/paste everything into the final report

USUAL PRACTICE: THEORY VS REALITY



In the end, this what you have produced!

USUAL PRACTICE: IN THE END

- ▶ Lots of files



USUAL PRACTICE: IN THE END

- ▶ Lots of files
- ▶ Cut and paste is not a reliable, reproducible approach!



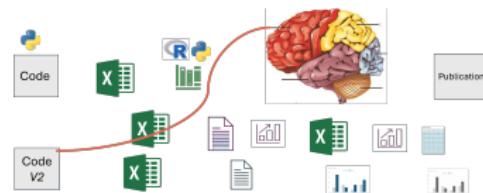
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- ▶ Or use (bad) "tools"



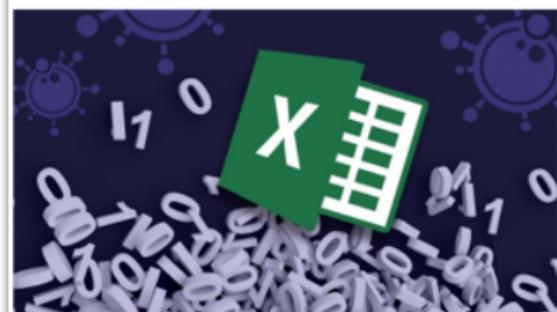
WHAT ARE THE ISSUES?

- ▶ Errors due to cut and paste

Excel: Why using Microsoft's tool caused Covid-19 results to be lost

By Leo Kelton
Technology desk editor

5 October 2020



The badly thought-out use of Microsoft's Excel software was the reason nearly 16,000 coronavirus cases went unreported in England.

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- ▶ Errors are difficult to track

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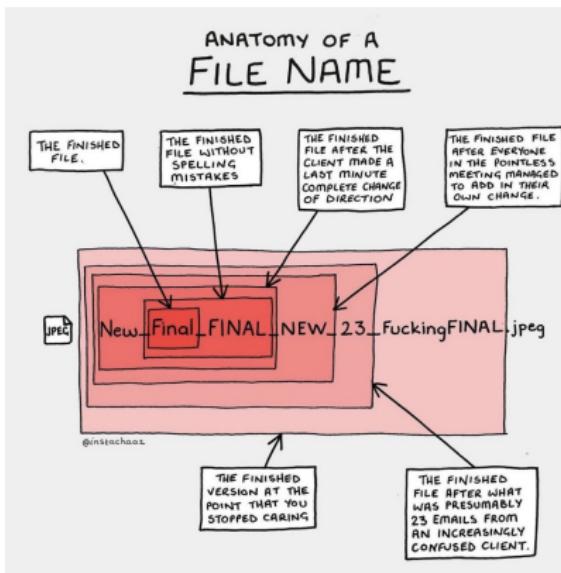
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- ▶ Each operator has his/her own approach



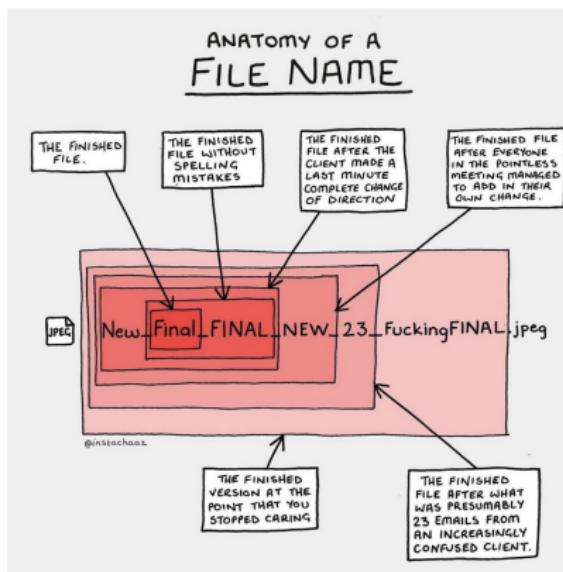
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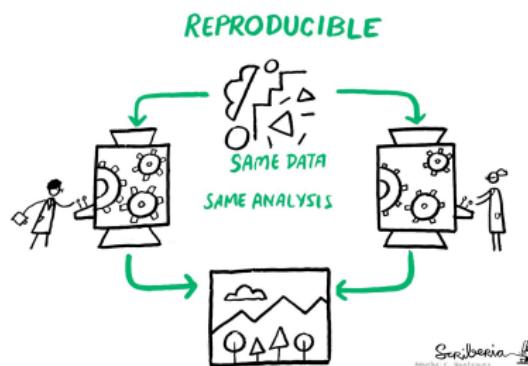
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- ▶ Several versions of code may coexist
- ▶ The steps aren't recorded
- ▶ Reproducibility is not granted



FUNDAMENTAL PRINCIPLES OF OFFICIAL STATISTICS

- ▶ Clear mention of the processes used to produce statistics



Fundamental Principles of Official Statistics*

For more information: unstats.un.org

The General Assembly
“Review recent resolutions” of the General Assembly and the Economic and Social Council highlighting the fundamental importance of official statistics for the national and international statistical agencies.

Bearing in mind the critical role of high-quality official statistical information in analysis and informed policy decision-making in support of sustainable development, peace and security as well as for mutual understanding, trade among the States and peoples of an increasingly connected world, demanding openness and transparency.

Recommending also that the essential trust of the public in the integrity of official statistical systems and confidence in statistics depend to a large extent on respect for the fundamental principles of official statistics as the basis of any society seeking to understand itself and respect the rights of its members, and in this context that professional independence and accountability of statistical agencies are crucial.

Stressing that, in order to be effective, the fundamental values and principles that govern the production of official statistics by legal and institutional frameworks and be respected at all political levels and by all stakeholders in national statistical systems,

Endorse the Fundamental Principles of Official Statistics, as adopted by the Statistical Commission in 1994* and reaffirmed in 2013, and endorsed by the Economic and Social Council in its resolution 205(2) of 24 July 2013.

* General Assembly resolution 65/211 adopted on 29 January 2014. The “Review” of the Principles was part of the original text.

These include General Assembly resolution 46/240 on the Fundamental Principles of Official Statistics, adopted by the Economic and Social Council resolution 205(2) of 24 July 2013, on strengthening statistical capacity and 2030/2030 on the Post-2015 Framework of Official Statistics.

For a one-page summary of the history of the initial adoption of the Fundamental Principles in 1994, see the document “Review of the Statistical Commission on its special session (Official Report) of the Economic and Social Council, 1994: Sustainable Development and the Post-2015 Framework of Official Statistics and their history is available from the website of the Statistics Division.

Principle 1: Relevance, Impartiality, and Equal Access
Official statistics provide an indispensable element in the information system of a democratic society, serving the Government, the economy and the public with data about the economic, demographic, social and environmental conditions. Official statistics that meet the test of practical utility are to be compiled and made available on an impartial basis by official statistical agencies to honour citizens' entitlement to public information.

Principle 2: Professional Standards, Scientific Principles, and Professional Ethics
To retain trust in official statistics, the statistical agencies need to demonstrate that they apply professional conventions, including scientific principles and professional ethics, on the methods and procedures for the collection, processing, storage and presentation of statistical data.

Principle 3: Accountability and Transparency
To facilitate a correct interpretation of the data, the statistical agencies are to present information according to scientific standards on the sources, methods and procedures of the statistics.

Principle 4: Prevention of Misuse
The statistical agencies are entitled to comment on erroneous interpretation and misuse of statistics.

Principle 5: Sources of Official Statistics
Data for statistical purposes may be drawn from all types of sources, including administrative records. Statistical agencies are to choose the source with regard to quality, timeliness, costs and the burden on respondents.

Principle 6: Confidentiality
Individual data collected by statistical agencies for statistical compilation, whether they refer to natural or legal persons, are to be strictly confidential and used exclusively for statistical purposes.

Principle 7: Legitimacy
The laws, regulations and measures under which the statistical systems operate are to be made public.

Principle 8: National Coordination
Coordination among statistical agencies or within countries is essential to achieve consistency and efficiency in the statistical system.

Principle 9: Use of International Standards
The use by statistical agencies in each country of international concepts, classifications and methods promotes the consistency and efficiency of statistical systems at all official levels.

Principle 10: International Cooperation
Bilateral and multilateral cooperation in statistics contributes to the improvement of systems of official statistics in countries.

FUNDAMENTAL PRINCIPLES OF OFFICIAL STATISTICS

- ▶ Clear mention of the **processes** used to produce statistics
- ▶ *To retain trust in official statistics, the statistical agencies need to decide according to strictly professional considerations, including scientific principles and professional ethics, on the methods and procedures for the collection, processing, storage and presentation of statistical data.*



Fundamental Principles of Official Statistics*

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The General Assembly
Reviewing recent resolutions² of the General Assembly and the Economic and Social Council highlighting the fundamental importance of official statistics for the national development process, the statistical agencies:
Desiring in view the critical role of high-quality official statistical information in analysis and informed policy decision-making in support of sustainable development, peace and security as well as for mutual knowledge and trade among the States and peoples of an increasingly connected world, demanding openness and transparency;
Reiterating in mind also that the essential trust of the public in the integrity of official statistical systems and confidence in statistics depend to a large extent on trust for the fundamental principles of official statistics on the basis of any society seeking to understand itself and respect the rights of its members, and in this context that professional independence is an accountability of statistical agencies crucial;
Stressing that, in order to be effective, the fundamental values and principles that govern the production of official statistics must be legal and institutional frameworks and be respected at all political levels and by all stakeholders in national statistical systems;

Endorse the Fundamental Principles of Official Statistics, as adopted by the Statistical Commission in 1994³ and reaffirmed in 2013, and endorsed by the Economic and Social Council in its resolution 205/21 of 24 July 2013.

* General Assembly resolution 65/217 adopted on 29 January 2014. The "Values of the Principles" are part of the original text.
These include General Assembly resolution 46/200 on the role of official statistics and Economic and Social Council resolution 205/13 on the 2013 World Population Conference, both of which stress the importance of strengthening statistical capacity and 2030/2030 on the implementation of the Fundamental Principles of Official Statistics.

² For further reading, please see the report of the initial adoption of the Fundamental Principles in 1994, see the report of the Statistical Commission on its special session (Official Report) of the Economic and Social Council, 1994. *Supplementary Information on the Adoption of the Fundamental Principles and their history* is available from the website of the Statistics Division.

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FUNDAMENTAL PRINCIPLES OF OFFICIAL STATISTICS

- ▶ Clear mention of the **processes** used to produce statistics
- ▶ *To retain trust in official statistics, the statistical agencies need to decide according to strictly professional considerations, including scientific principles and professional ethics, on the methods and procedures for the collection, processing, storage and presentation of statistical data.*
- ▶ In short, **processes** are important!



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RAP could be thought of as an approach to working Adopting a set of technical skills and open-source best practices to adopt when creating a data output



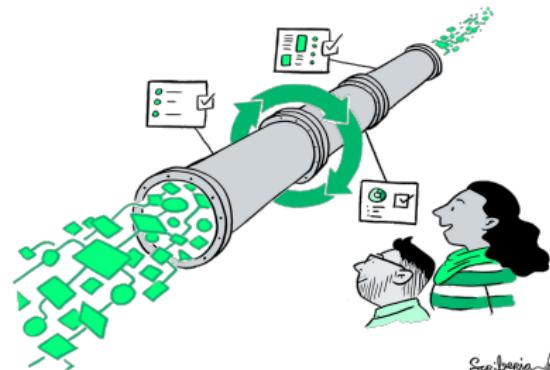
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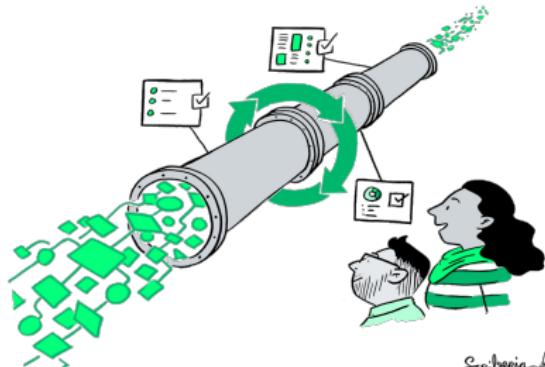
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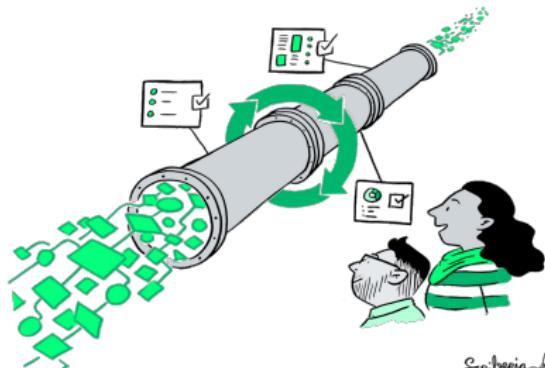
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- ▶ It builds trust



WHAT DOES A RAP LOOK LIKE?



C

Ideally, Input (website) and output (report) are linked

WHAT DOES A RAP LOOK LIKE?



C

Many steps are needed to create a report

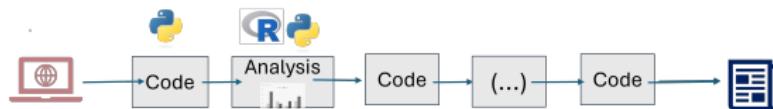
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C

All steps should be linked in a structured process

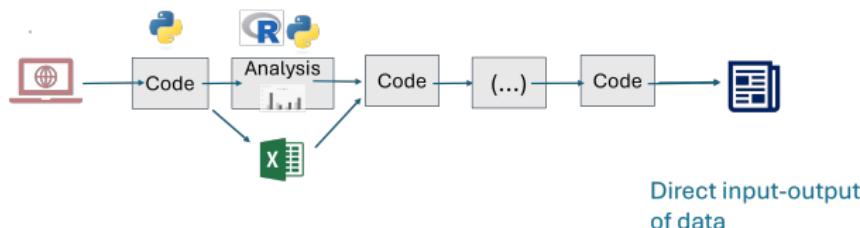
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And only through code (Python, R), no copy/paste

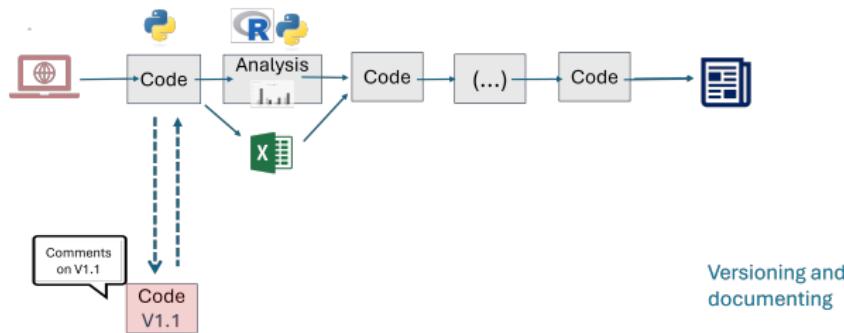
C

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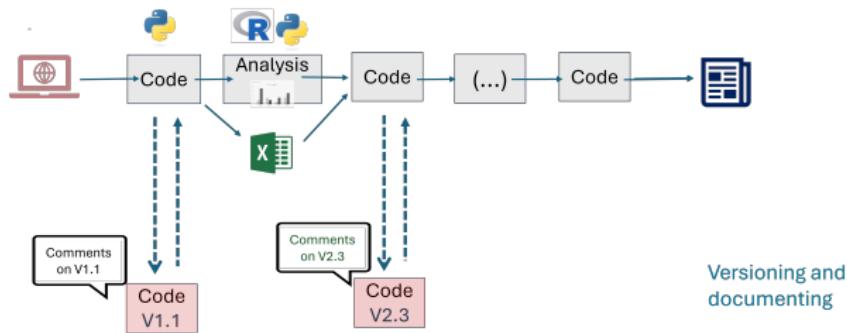
There may be side-products, but with explicit output-input links

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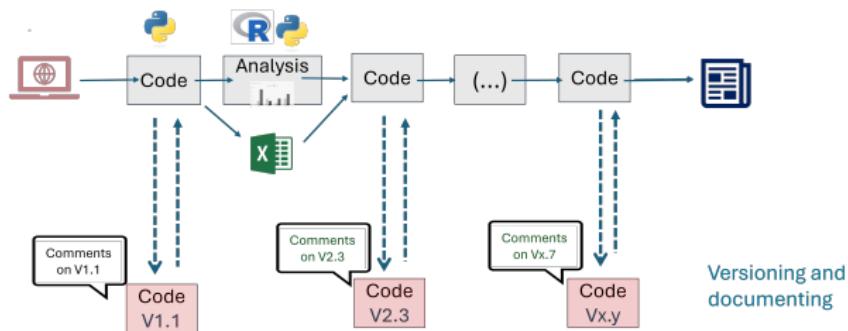
If needed, code can be updated (new versions)

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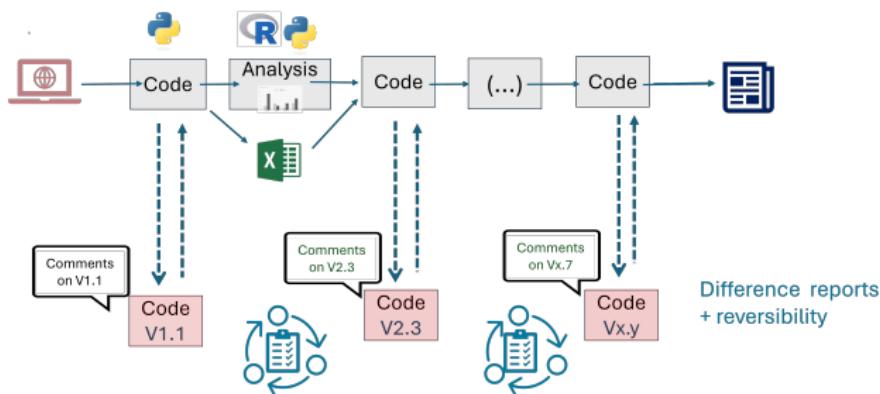
And comments added for each change

WHAT DOES A RAP LOOK LIKE?



Documentation on the process builds up with code changes

WHAT DOES A RAP LOOK LIKE?



C

Other contributors are welcome!

Motivation
oooo

Issues
oo

RAP
oo

Principles
●oooooooooooo

Version Control
oooooooooooo

Takeaways
o

Resources
o

RAP PRINCIPLES:

Motivation
○○○○

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- ▶ Good coding practices

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- ▶ Reusable (modular) code
- ↪ Build blocs, update blocs, change blocs, test blocs
- ▶ Transparency
- ↪ Show what you, do what you say
- ▶ Use open source tools
- ↪ Free, reusable, huge community
- ▶ Version control
- ↪ Easy to track code, easy to share, easy to update, ...
- ▶ Good coding practices
- ↪ Write for humans, not for machines

RAP PRINCIPLES:

- ▶ Automation (*as much as you can*)
- ↪ Avoid manual work
- ▶ Reusable (modular) code
- ↪ Build blocs, update blocs, change blocs, test blocs
- ▶ Transparency
- ↪ Show what you, do what you say
- ▶ Use open source tools
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- ↪ Write for humans, not for machines
- ▶ Testing

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- ▶ Good coding practices
- ↪ Write for humans, not for machines
- ▶ Testing
- ▶ Peer-review

Motivation
oooo

Issues
oo

RAP
oo

Principles
o●oooooooooooo

Version Control
oooooooooooo

Takeaways
o

Resources
o

RAP PRINCIPLES:

RAP PRINCIPLES:

These principles translate into:

Good Practices

+

Good Tools

RAP PRINCIPLES:

These principles translate into:

Good Practices

+

Good Tools

- We'll detail some of these practices and tools

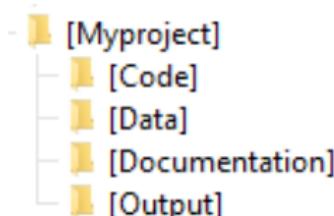
GOOD PRACTICES: ORGANIZE YOUR WORK

Have a clear directory structure

GOOD PRACTICES: ORGANIZE YOUR WORK

Have a clear directory structure

- ▶ Separate files into data, code, docs, etc.

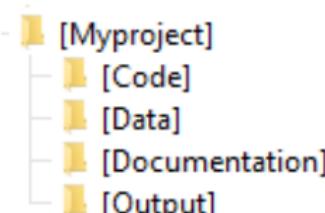


Example of a well-organized directory structure.

GOOD PRACTICES: ORGANIZE YOUR WORK

Have a clear directory structure

- ▶ Separate files into data, code, docs, etc.
- ▶ Make directories portable (relative path)



Example of a well-organized directory structure.

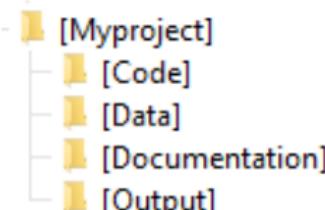
Usual

```
mydata =  
pd.read_csv("c://ESCAP/Webscraping/Data/WebData.csv")
```

GOOD PRACTICES: ORGANIZE YOUR WORK

Have a clear directory structure

- ▶ Separate files into data, code, docs, etc.
- ▶ Make directories portable (relative path)



Example of a well-organized directory structure.

Usual

```
mydata =  
pd.read_csv("c://ESCAP/Webscraping/Data/WebData.csv")
```

Better

```
Assuming your code is in c://ESCAP/Webscraping/Code/  
mydata = pd.read_csv("../Data/WebData.csv")
```

GOOD PRACTICES: ORGANIZE YOUR WORK

Use naming conventions: For files/code

- ▶ Avoid lazy names

Usual
prog1.py
prog2.py
Stat.py
progC.py
progP.py

GOOD PRACTICES: ORGANIZE YOUR WORK

Use naming conventions: For files/code

- ▶ Avoid lazy names
- ▶ Meaningful files names

Usual

- prog1.py
- prog2.py
- Stat.py
- progC.py
- progP.py

Better

- Scraping_Data.py
- Cleaning_Data.py
- Stats_Tables.py
- Classification.py
- Price_CPI.py

GOOD PRACTICES: ORGANIZE YOUR WORK

Use naming conventions: For files/code

▶ Avoid lazy names	Usual prog1.py prog2.py Stat.py progC.py progP.py	Even better 01_Scraping_data.py 02_Cleaning_data.py 03_Classification.py 04_Stats_Tables.py 04_Price_CPI.py
▶ Meaningful files names		
▶ Order of execution		

GOOD PRACTICES: ORGANIZE YOUR WORK

Use naming conventions: For outputs

- ▶ Avoid numbering
- Usual
 - Table1.pdf
 - Table2.pdf
 - Graph.jpg
 - Model.csv

GOOD PRACTICES: ORGANIZE YOUR WORK

Use naming conventions: For outputs

- ▶ Avoid numbering
- ▶ Explicit type of output

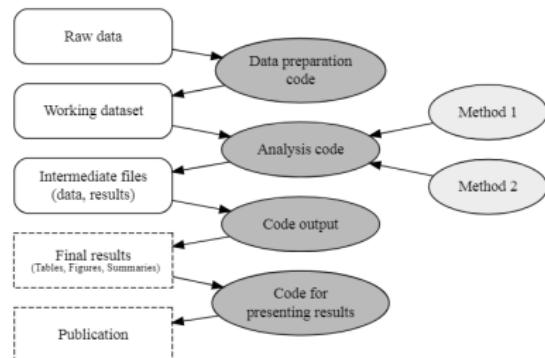
Usual
Table1.pdf
Table2.pdf
Graph.jpg
Model.csv

Better
Stat_Desc_Table.pdf
Price_Stat_Table.pdf
Dress_Prices_Graphic.jpg
All_prices_Results.csv

GOOD PRACTICES FOR AUTOMATION

Keep track of the workflow:

- ▶ Cut and paste should be avoided

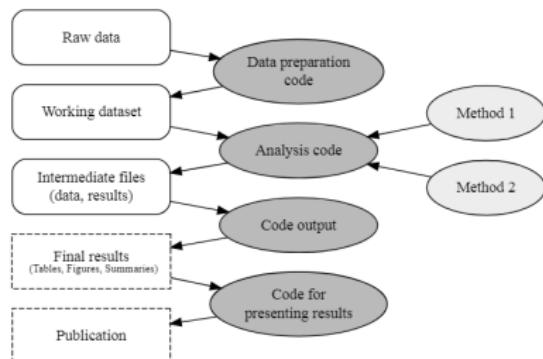


Example of a simple workflow.

GOOD PRACTICES FOR AUTOMATION

Keep track of the workflow:

- ▶ Cut and paste should be avoided
- ▶ Every step of the process is coded

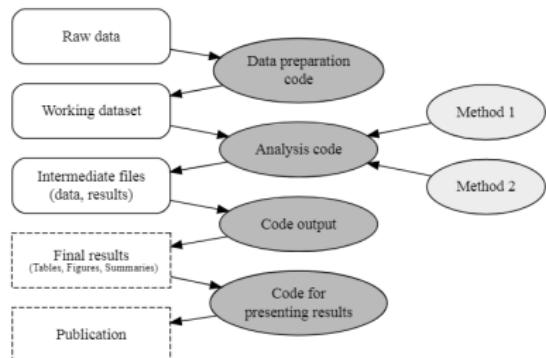


Example of a simple workflow.

GOOD PRACTICES FOR AUTOMATION

Keep track of the workflow:

- ▶ Cut and paste should be avoided
- ▶ Every step of the process is coded
- ▶ Manage (and draw) the workflow

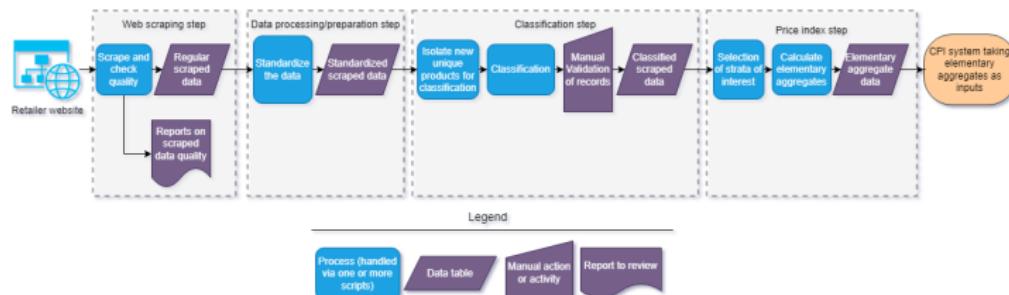


Example of a simple workflow.

GOOD PRACTICES FOR AUTOMATION

Keep track of the workflow:

Here is a workflow from web scraping to elementary aggregate workflow. We'll cover it more next week!



Created by Serge Goussev.

VERY GOOD PRACTICES

Use a version control system (Git/GitHub)



More on Version Control later

GOOD CODING PRACTICES: CODE FOR OTHERS

Program with style:

Use literate programming

*“Let us concentrate rather on explaining to humans
what we want the computer to do”*

D. Knuth (1984)

GOOD CODING PRACTICES: CODE FOR OTHERS

Program with style:

"(. . .) code is read much more often than it is written"

Guido van Rossum (2013 -PEP8)

PEP stands for *Python Enhancement Proposals*

GOOD CODING PRACTICES: CODE FOR OTHERS

Program with style:

Use conventions on layout (Comments, indentation,...)

Contents

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- Code Lay-out
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 - Tabs or Spaces?
 - Maximum Line Length
 - Should a Line Break Before or After a Binary Operator?
 - Blank Lines
 - Source File Encoding
 - Imports
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- String Quotes
- Whitespace in Expressions and Statements
 - Pet Peeves
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 - Names to Avoid
 - ASCII Compatibility
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PEP 8 – Style Guide for Python Code

Author: Guido van Rossum <guido at python.org>, Barry Warsaw <barry at python.org>, Alyssa Coghlan <cohoglan at gmail.com>

Status: Active

Type: Process

Created: 05-Jul-2001

Post-History: 05-Jul-2001, 01-Aug-2013

► Table of Contents

Introduction

This document gives coding conventions for the Python code comprising the standard library in the main Python distribution. Please see the companion informational PEP describing style guidelines for the C code in the C implementation of Python.

This document and [PEP 257](#) (Docstring Conventions) were adapted from Guido's original Python Style Guide essay, with some additions from Barry's style guide [2].

This style guide evolves over time as additional conventions are identified and past conventions are rendered obsolete by changes in the language itself.

Many projects have their own coding style guidelines. In the event of any conflicts, such project-specific guides take precedence for that project.

A Foolish Consistency is the Hobgoblin of Little Minds

One of Guido's key insights is that code is read much more often than it is written. The guidelines provided here are intended to improve the readability of code and make it consistent across the wide spectrum of Python code. As PEP 20 says, "Readability counts".

A style guide is about consistency. Consistency with this style guide is important. Consistency within a project is more important. Consistency within one module or function is the most important.

However, know when to be inconsistent – sometimes style guide recommendations just aren't applicable. When you run into one of those situations, look at other examples and decide what other style guide(s) that particular ask!

GOOD CODING PRACTICES: CODE FOR OTHERS

Program with style

- ▶ Avoid ambiguities

Usual

```
df['sex'] = np.where(df['gender'] ==  
'1001', 1, 2)
```

Better

```
df['female'] = np.where(df['gender'] ==  
'1001', 1, 0)  
df['male'] = np.where(df['gender'] !=  
'1001', 1, 0)
```

GOOD CODING PRACTICES: CODE FOR OTHERS

Program with style

- ▶ Avoid ambiguities
- ▶ Avoid changing units

Usual

```
df['gdp'] = df['gdp'] / 118.722
```

GOOD CODING PRACTICES: CODE FOR OTHERS

Program with style

- ▶ Avoid ambiguities
- ▶ Avoid changing units

Usual

```
df['gdp'] = df['gdp'] / 118.722
```

Better

```
df['gdp_US'] = df['gdp'] / 118.722
```

GOOD CODING PRACTICES: CODE FOR OTHERS

Program with style

- ▶ Avoid ambiguities
- ▶ Avoid changing units

Usual

```
df['gdp'] = df['gdp'] / 118.722
```

Even better

```
US_Vanu_exch_rate = 118.722
df['gdp_US'] = df['gdp'] /
US_Vanu_exch_rate
```

GOOD PRACTICES: MODULARITY

Create reusable objects

- ▶ Store values

Usual

```
Current_Data = Mydata[Mydata['year'] == 2023]
```

GOOD PRACTICES: MODULARITY

Create reusable objects

- ▶ Store values

Usual

```
Current_Data = Mydata[Mydata['year'] == 2023]
```

Better

```
Current_year = 2023
```

```
Current_Data= Mydata[Mydata['year'] ==  
Current_year]
```

- Avoid repetitions

GOOD PRACTICES: MODULARITY

Create reusable objects

- ▶ Store values
- Avoid repetitions

Usual

```
# - Exports for Beef -
data = Mydata[Mydata['export'] == 'Beef']
plt.plot(data['Year'], data['Value'])
plt.title('Export for Beef')

# - Also for Kava -
data = Mydata[Mydata['export'] == 'Kava']
plt.plot(data['Year'], data['Value'])
plt.title('Export for Kava')

# - Also for ... -
```

GOOD PRACTICES: MODULARITY

Create reusable objects

- ▶ Store values
- Avoid repetitions
- ▶ Use functions

Better

```
# Defining a generic function
def plot_export(export_type):
    data = Mydata[Mydata['export'] == export_type]
    plt.plot(data['Year'], data['Value'])
    plt.title(f'Export for {export_type}')
    plt.show()

# Run the function for several products
plot_export("Beef")
plot_export("Kava")
```

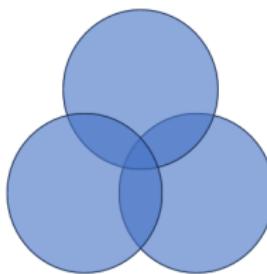
GOOD PRACTICES: MODULARITY

Create reusable objects

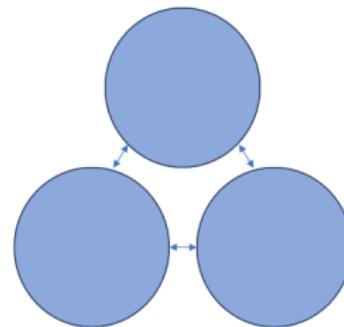
- ▶ Store values
- Avoid repetitions

- ▶ Use functions

- ▶ Use independent blocks



Tight Coupling



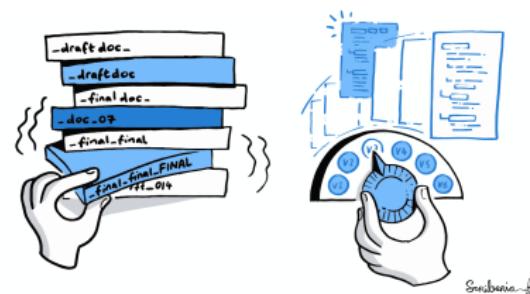
Loose Coupling

Source: NHS Community of Practice

VERSION CONTROL KEEPS TRACKS OF YOUR WORK

Tracking three W questions:

What changes?



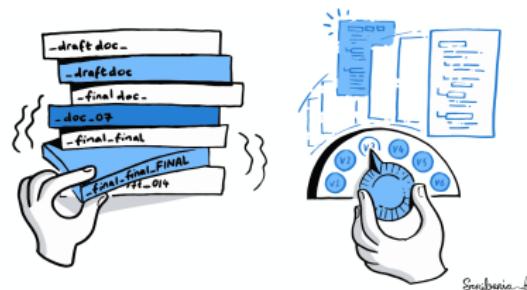
Source: The Turing Way project

VERSION CONTROL KEEPS TRACKS OF YOUR WORK

Tracking three W questions:

What changes?

Who made the changes?



Source: The Turing Way project

VERSION CONTROL KEEPS TRACKS OF YOUR WORK

Tracking three W questions:

What changes?

Who made the changes?

When were the changes made?



Source: The Turing Way project

VERSION CONTROL KEEPS TRACKS OF YOUR WORK

Tracking three W questions:

What changes?

Who made the changes?

When were the changes made?



Source: The Turing Way project

TRANSPARENCY, ACCOUNTABILITY & REPRODUCIBILITY

- ▶ Version control provides a detailed history of changes

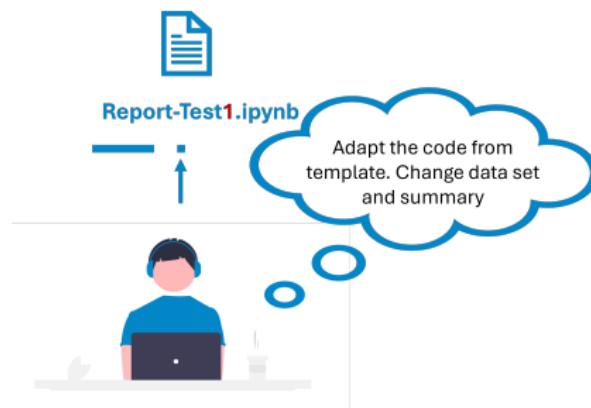
TRANSPARENCY, ACCOUNTABILITY & REPRODUCIBILITY

- ▶ Version control provides a detailed history of changes
- ▶ Each modification is attributed to a specific user

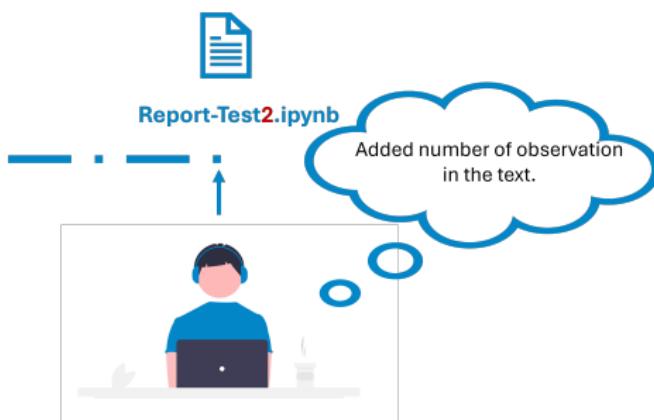
TRANSPARENCY, ACCOUNTABILITY & REPRODUCIBILITY

- ▶ Version control provides a detailed history of changes
- ▶ Each modification is attributed to a specific user
- ▶ Promotes accountability, transparency & reproducibility

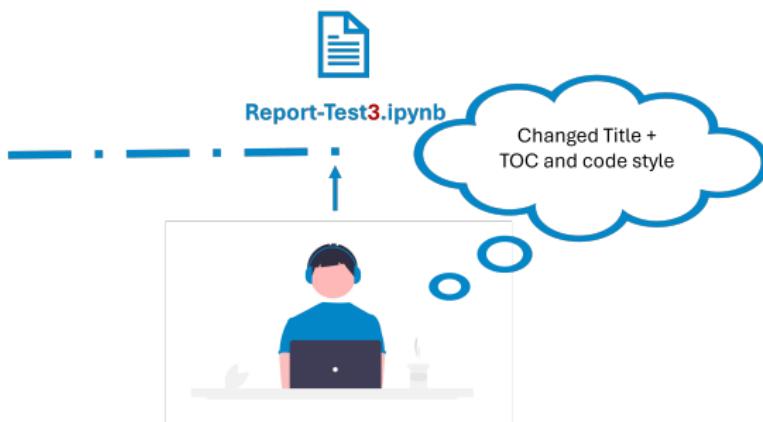
FILE EVOLUTION WITHOUT VERSION CONTROL



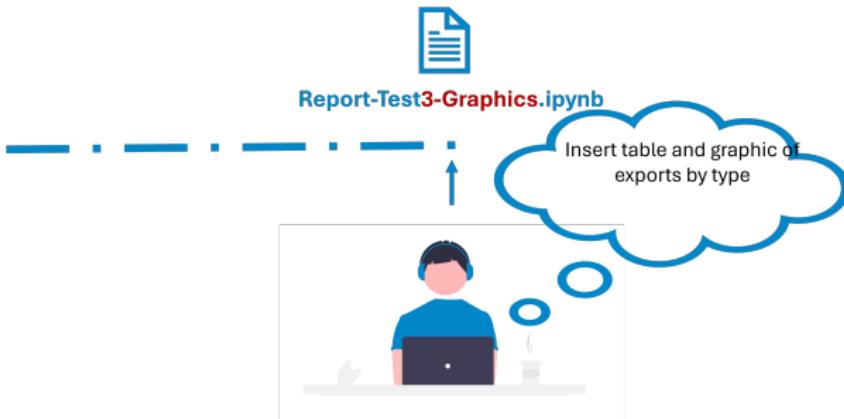
FILE EVOLUTION WITHOUT VERSION CONTROL



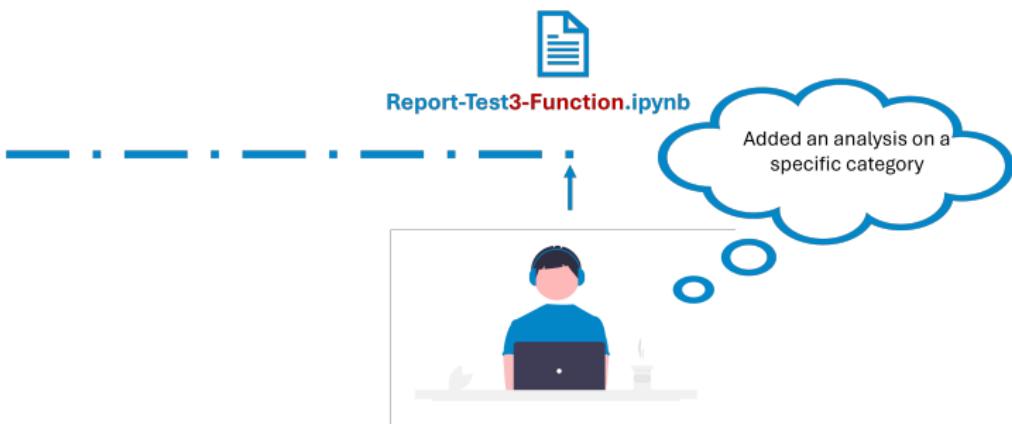
FILE EVOLUTION WITHOUT VERSION CONTROL



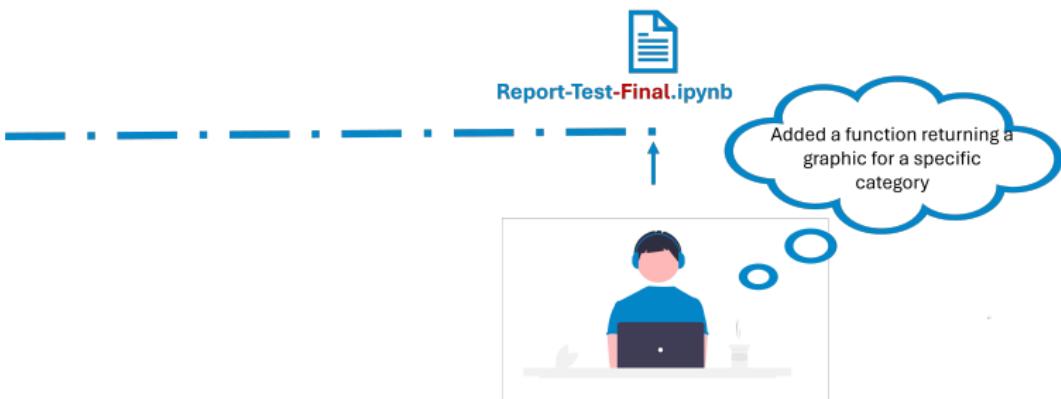
FILE EVOLUTION WITHOUT VERSION CONTROL



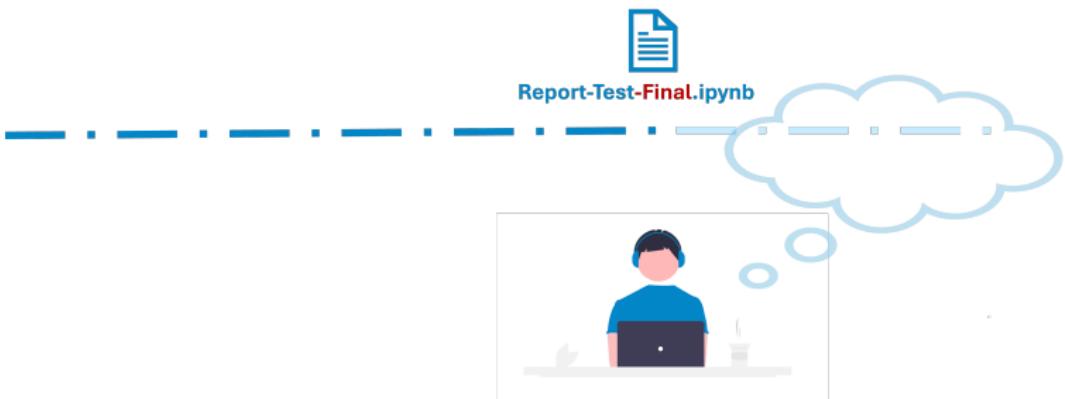
FILE EVOLUTION WITHOUT VERSION CONTROL



FILE EVOLUTION WITHOUT VERSION CONTROL



FILE EVOLUTION WITHOUT VERSION CONTROL



FILE EVOLUTION WITHOUT VERSION CONTROL

Usual ways to keep track of changes:

FILE EVOLUTION WITHOUT VERSION CONTROL

Usual ways to keep track of changes:

- ▶ New file after each change



[Report-Test1.ipynb](#)



[Report-Test3-Graphics.ipynb](#)



[Report-Test2.ipynb](#)



[Report-Test3-Function.ipynb](#)



[Report-Test3.ipynb](#)



[Report-Test-Final.ipynb](#)

FILE EVOLUTION WITHOUT VERSION CONTROL

Usual ways to keep track of changes:

- ▶ New file after each change
- Need to open each file to see the change



[Report-Test1.ipynb](#)



[Report-Test3-Graphics.ipynb](#)



[Report-Test2.ipynb](#)



[Report-Test3-Function.ipynb](#)



[Report-Test3.ipynb](#)



[Report-Test-Final.ipynb](#)

FILE EVOLUTION WITHOUT VERSION CONTROL

Usual ways to keep track of changes:

- ▶ New file after each change
- Need to open each file to see the change
- Names have to be explicit



[Report-Test1.ipynb](#)



[Report-Test3-Graphics.ipynb](#)



[Report-Test2.ipynb](#)



[Report-Test3-Function.ipynb](#)



[Report-Test3.ipynb](#)



[Report-Test-Final.ipynb](#)

FILE EVOLUTION WITHOUT VERSION CONTROL

Usual ways to keep track of changes:

- ▶ New file after each change
- ↳ Need to open each file to see the change
- ↳ Names have to be explicit
- ▶ Only the last file with lots of comments



Report-Test3-Graphics-
Functions-Final-
Chris.ipynb

FILE EVOLUTION WITHOUT VERSION CONTROL

Usual ways to keep track of changes:

- ▶ New file after each change
- ↳ Need to open each file to see the change
- ↳ Names have to be explicit
- ▶ Only the last file with lots of comments
- ▶ Not fulfilling the 3 W...



Report-Test3-Graphics-
Functions-Final-
Chris.ipynb

FILE EVOLUTION WITH VERSION CONTROL

You can see exactly what has been going on!

Showing 2 changed files with 325 additions and 24 deletions.

Filter changed files

prices_scrape/notbooks

session11_code.html

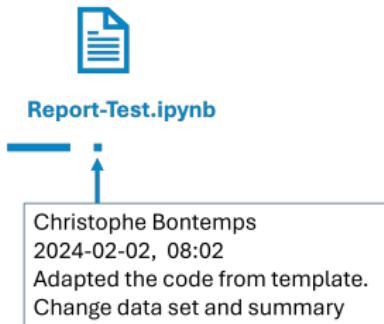
session11_code.pybm

Whitespace Ignore whitespace Split Unified

Line Number	Code	Line Number	Code
7531	</div>	7558	</div>
7532	<div class="jp-InputArea jp-Cell-InputArea"><div class="jp-InputPrompt jp-InputArea-prompt">	7559	<div class="jp-InputArea jp-Cell-InputArea"><div class="jp-InputPrompt jp-InputArea-prompt">
7533	</div><div class="jp-RenderedHTMLCommon jp-RenderedMarkdown jp-MarkdownOutput" data-mime-type="text/markdown">	7560	</div><div class="jp-RenderedHTMLCommon jp-RenderedMarkdown jp-MarkdownOutput" data-mime-type="text/markdown">
7534	+ <p>As usual, one first need some packages to be loaded</p>	7561	+ <h3 id="Defining-the-Website-URL">Defining the Website URL</h3>#It is good to have a look at the website beforehand and navigate a bit to see if the structure looks easy to navigate, and formatting consistent</p>
7535	</div>	7562	</div>
7536	</div>	7563	</div>
7537	</div>	7564	</div>
7538	+ @@ -7543,9 +7570,8 @@ <h2 id="Initial-scrap:Only-one-page">Initial scrap: Only one page<a class="anch	7565	<div class="jp-InputArea jp-Cell-InputArea-prompt">[/]</div>
7539	<div class="jp-InputPrompt jp-InputArea-prompt">[/]</div>	7566	<div class="jp-CodeMirrorEditor jp-Editor jp-InputArea-editor" data-type="inline">
7540	<div class="jp-CodeMirrorEditor jp-Editor jp-InputArea-editor" data-type="inline">	7567	<div class="cm-editor cm-jupyter">
7541	<div class="highlight hi-python3"><pre>	7568	+ <div class="highlight hi-python3"><pre>
7542	import as	7569	# Define the URL of the website
7543	pd</pre></div>	7570	+ #
7544	</div>	7571	"https://www.farmers.co.nz/women/fashion/tops"
7545	</div>	7572	</pre></div>
7546	+ <div class="highlight hi-python3"><pre>	7573	</div>
7547	from as	7574	</div>
7548	pd</pre></div>	7575	</div>
7549	</div>	7576	</div>
7550	</div>	7577	</div>
7551	</div>		
7552	+ @@ -7558,7 +7584,7 @@ <h2 id="Initial-scrap:Only-one-page">Initial scrap: Only one page<a class="anch		
7553	<div class="jp-InputArea jp-Cell-InputArea"><div class="jp-InputPrompt jp-InputArea-prompt">		
7554	</div><div class="jp-RenderedHTMLCommon jp-RenderedMarkdown jp-MarkdownOutput" data-mime-type="text/markdown">		
7555	+ <p>Then the URL of the website has to be tested. We send a request to the web server hosting the URL,		+ <h3 id="Testing-the-website">Testing the website</h3>#
7556			
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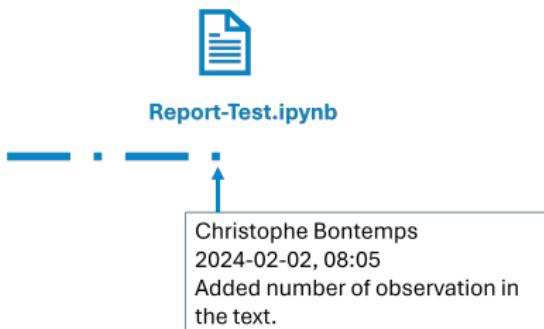
FILE EVOLUTION WITH VERSION CONTROL

Record a message (*commit*) for each change!



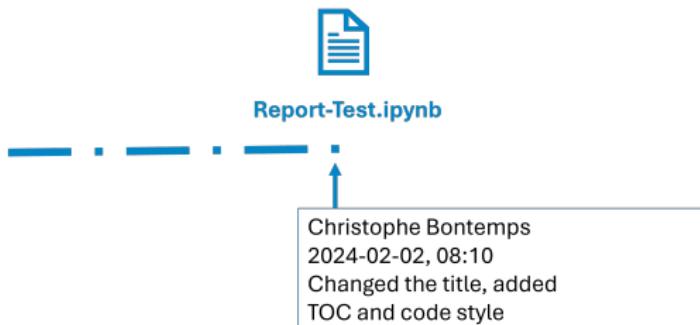
FILE EVOLUTION WITH VERSION CONTROL

Record a message (*commit*) for each change!



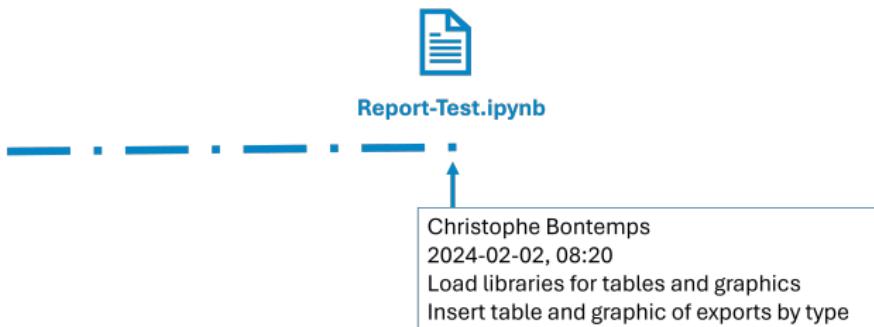
FILE EVOLUTION WITH VERSION CONTROL

Record a message (*commit*) for each change!



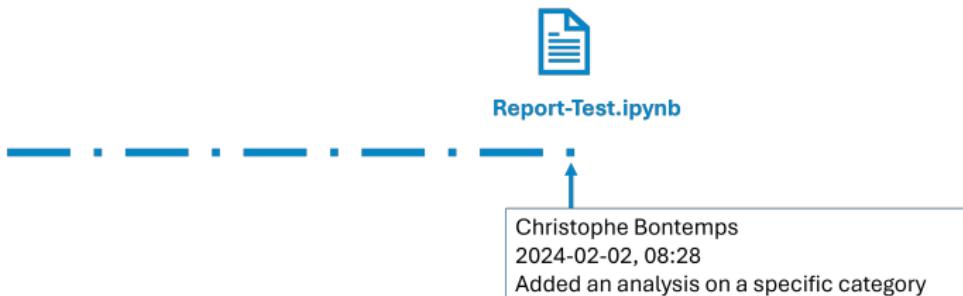
FILE EVOLUTION WITH VERSION CONTROL

Record a message (*commit*) for each change!



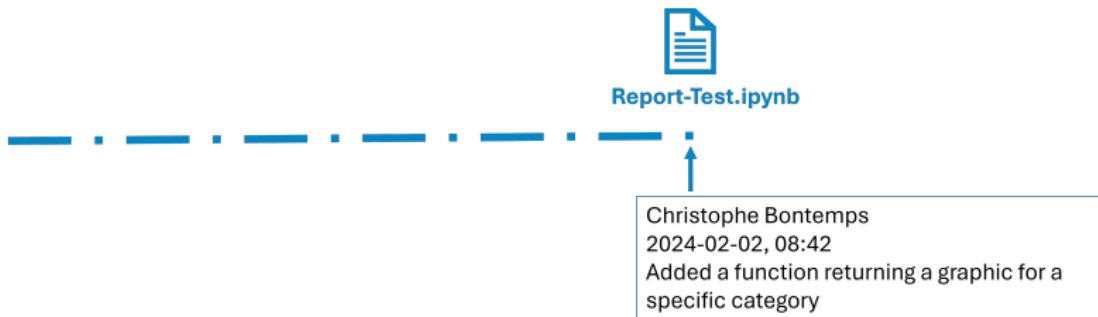
FILE EVOLUTION WITH VERSION CONTROL

Record a message (*commit*) for each change!



FILE EVOLUTION WITH VERSION CONTROL

Record a message (*commit*) for each change!



FILE EVOLUTION WITH VERSION CONTROL

Record a message (*commit*) for each change!



Report-Test.ipynb



THE HISTORY OF THE FILE IS RECORDED!

Each version is documented (with *commits*)



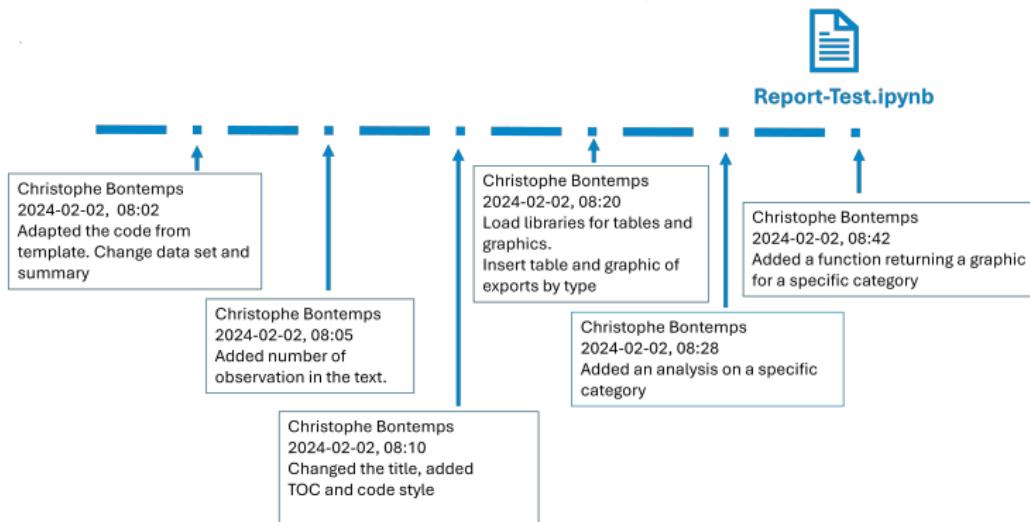
THE HISTORY OF THE FILE IS RECORDED!

Each version is documented (with *commits*)



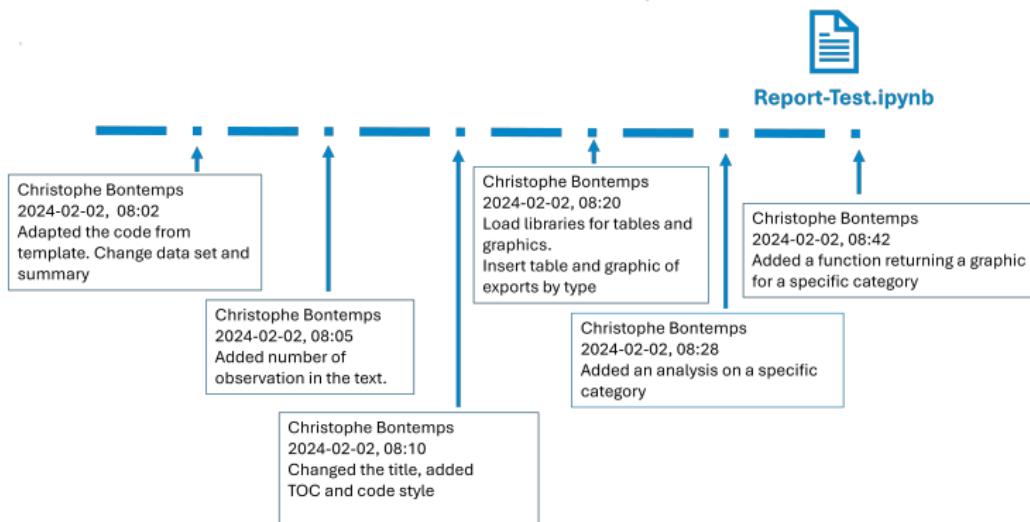
THE HISTORY OF THE FILE IS RECORDED!

Each version embeds the full history!



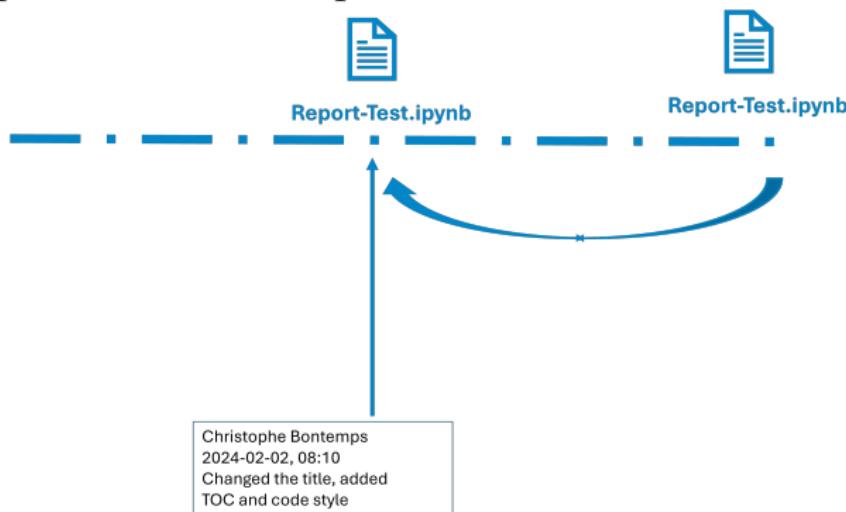
THE HISTORY OF THE FILE IS RECORDED!

Each version embeds the full history!



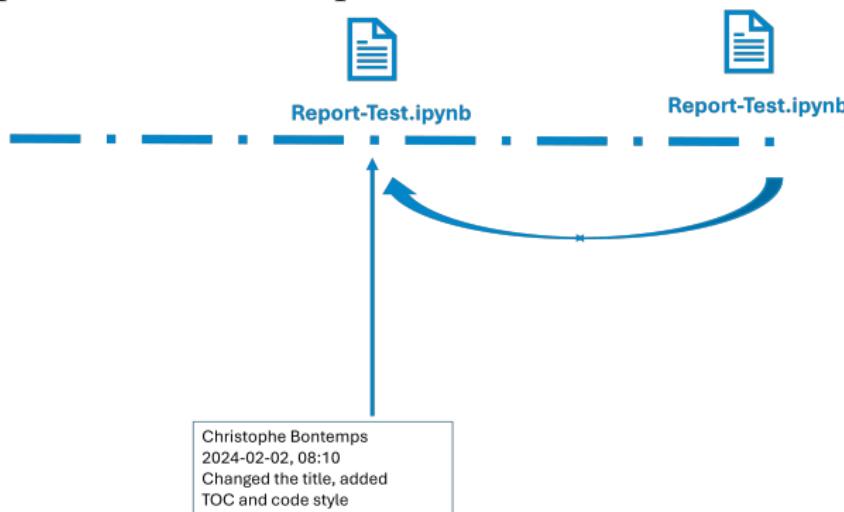
GOING BACK (*revert*) IS POSSIBLE

It is possible to review previous version...



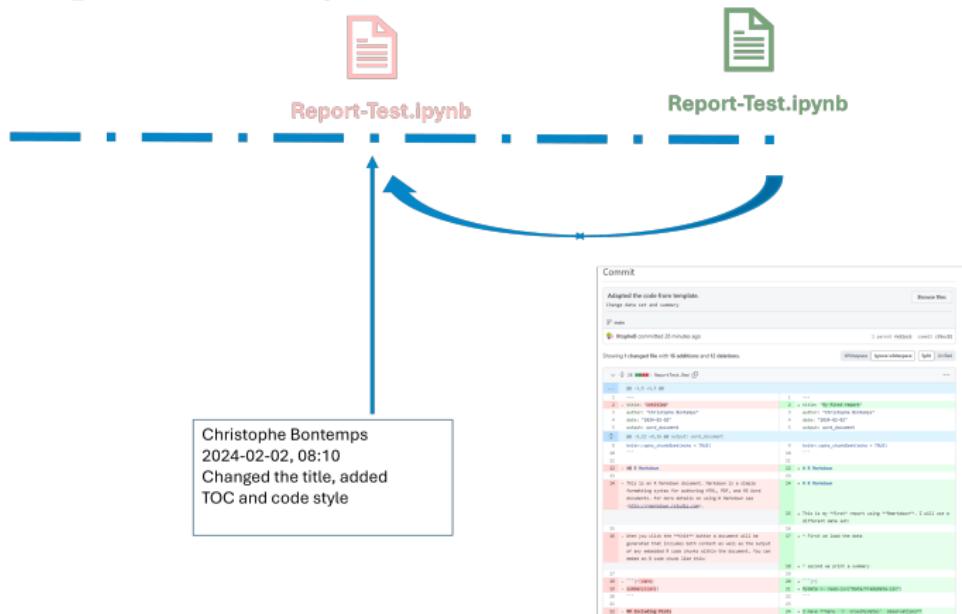
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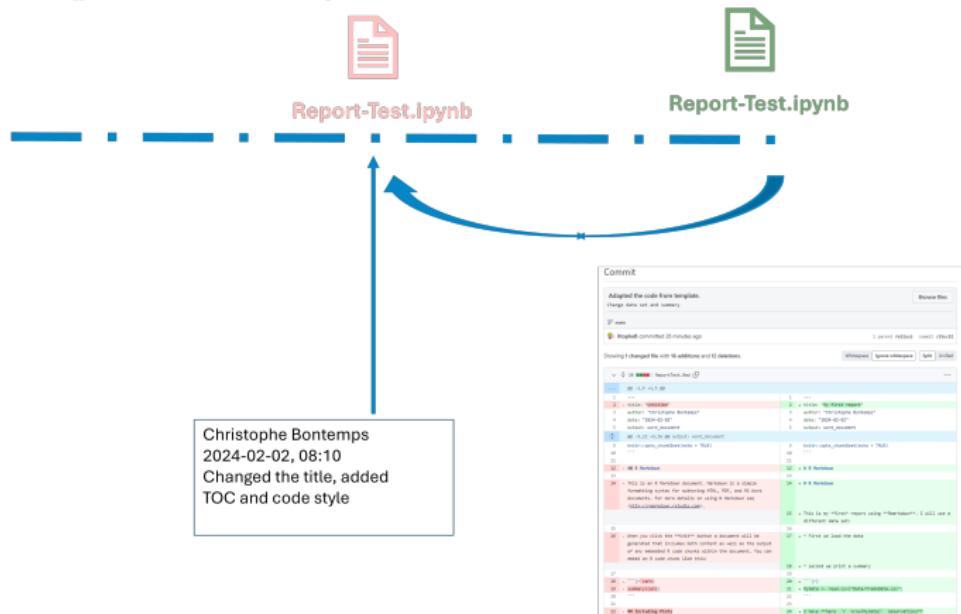
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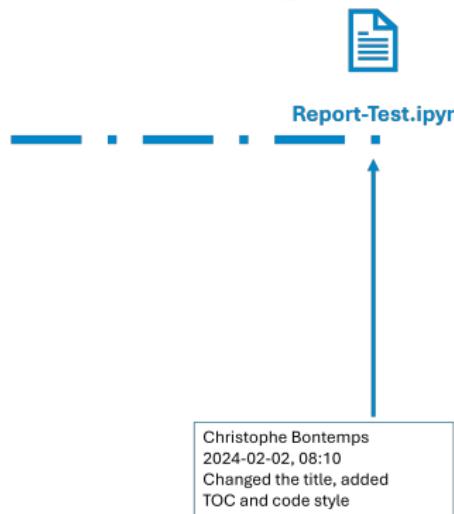
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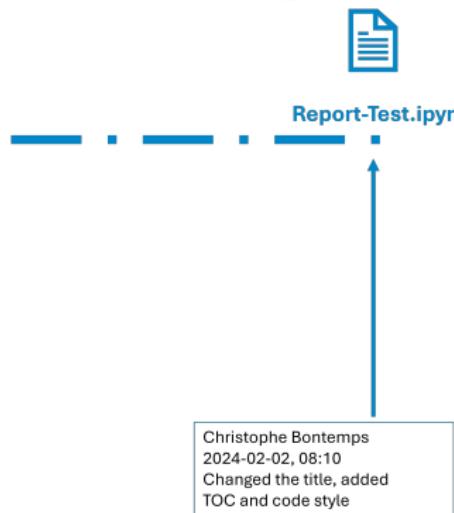
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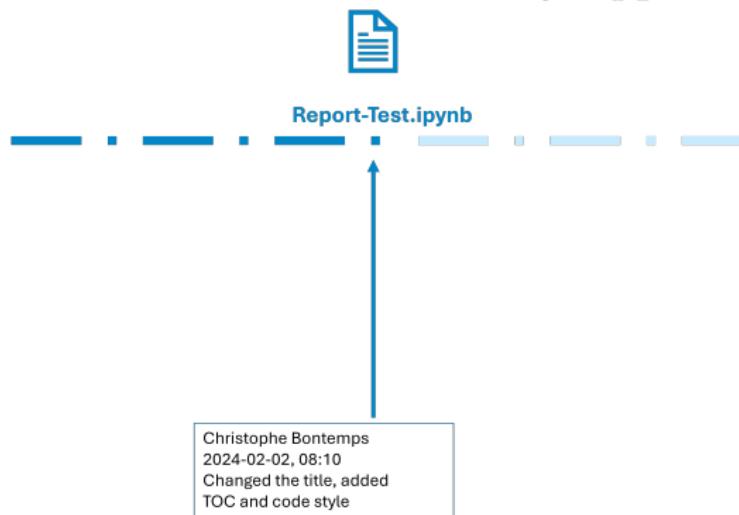
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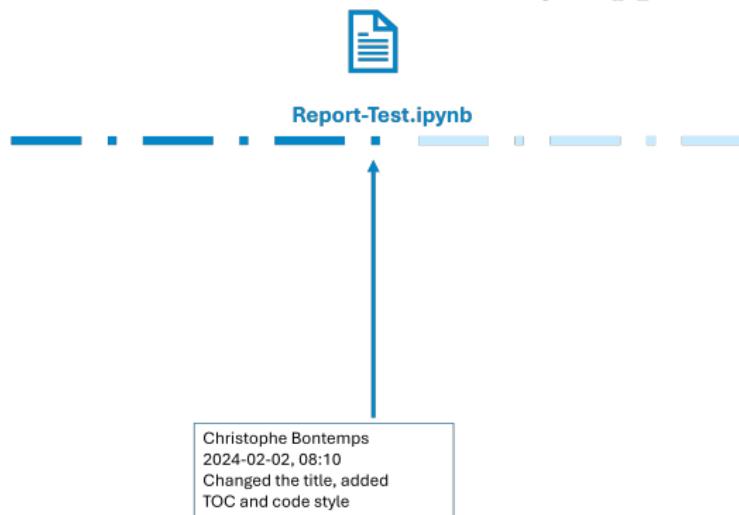
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Motivation
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Issues
oo

RAP
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Principles
oooooooooooo

Version Control
ooooooo●o

Takeaways
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Resources
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GOOD NEWS!

Version Control will help you

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- ▶ Version Control is integrated in VS Code (*& RStudio*)



"Visual Studio Documentation"

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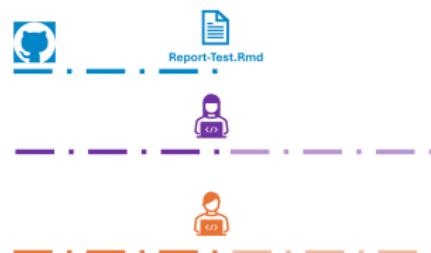


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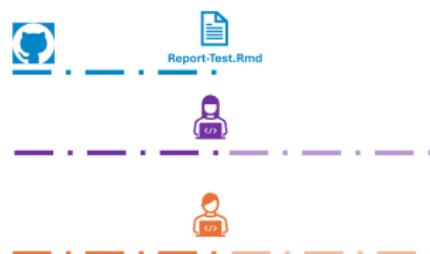
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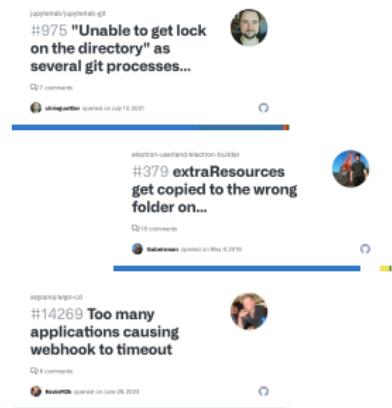
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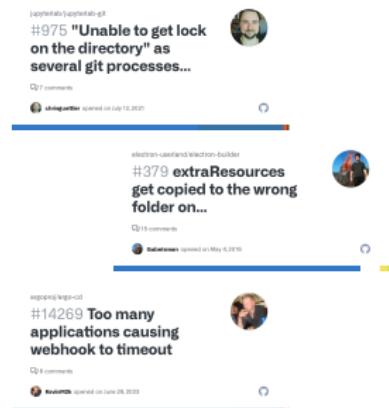
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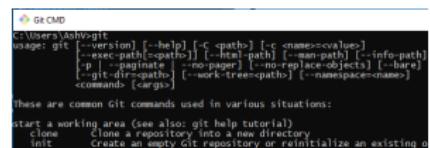
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- ▶ Git works *mostly* in command mode



```
git CMD
C:\Users\Ashish\git
usage: git [--help] [--version] [-c <name>=<value>]
   [--exec-path[=<path>]] [--html-path] [--man-path] [--info-path]
   [--git-dir[=<path>]] [--work-tree[=<path>]] [--namespace[=<name>]]
   [--command[=<args>]]

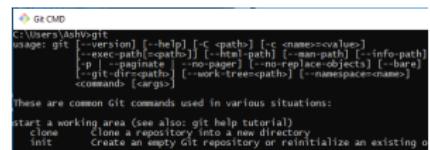
These are common Git commands used in various situations:
start a working area (see also: git help tutorial)
clone a local repository into a new directory
init Create an empty Git repository or reinitialize an existing one
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Ashish Vishwakarma

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- ▶ Backups your work

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- ▶ Version control is a life-changer
- ▶ Building a RAP is a collective process



USEFUL RESOURCES

- ▶ NHS Community of Practice
- ▶ This course website (created by Serge Goussev)
- ▶ Vanuatu Bureau of Statistics implementation of RAP
- ▶ SIAP's (free) online RAP course
- ▶ The UK government RAP website.
- ▶ UK best practice documentation.
- ▶ A free RAP course to teach you all you need to know.
- ▶ How the Data Science Campus sets its coding standards.
- ▶ A new open-source book from the Alan Turing institute setting out how to do reproducible data science.