Automatic pdf report from a python script with pandoc

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Abstract

Export a pdf report (code, outputs) commented with the Markdown embedded in the python script, a bash preprocessing and pandoc. Everything is launched whithin the python script.

Contents

1 Which problem does this solve?

To have the possibility to make a report linked to a python script is an interesting function. It allows to keep notes about the script (why, how), to show and share the results. The best location of the report is inside the script itself. A pdf file as documentation has in addition a confortable readability. Tools like Pweave offer this functionalities, but my knowledge is inadequate to solve the problems that may occur… or occurred like the last time I updated my Manjaro laptop…

So I came to this solution, probably with a lower performance but that uses standard tools, explicit rather simple steps.

2 How does it work?

2.1 The features

The expected features are :

- To export a pdf file that includes :

  - The python code cut in chunks
  - All the needed text to explain the goal and outputs of the script
  - Math and formulas
  - The outputs of the script, to the console or graphs (matplotlib)
- The script shall remain directly executable with no modifications
- The only maintained file is the script

2.2 The proposed solution

The script shall include :

- Some codes to store the outputs
- Lines of markdown starting by a mark
- Some lines to include external text files

The mark is a unique sequence of characters starting by "#" (comment in python)

Then the script is preprocessed to :

- remove the 2 first lines (python3 and coding specification)
- remove the mark
- insert the external files
- store the result into an intermediate markdown file

The markdown file is then transformed in pdf with pandoc

2.3 The sources of inspiration

The idea of a mark "#%%" comes from pweave, spyder to embedded markdown in the python script.

The first test shown that with, at least, a French keyboard this sequence is hard to use (need AltGr then shift) and is visually intrusive in editor. Several "#" are not allowed (used by markdown) so I changed to "#~~" as "~" is next key on the left of "#".

The script filename.py is copied into an image markdown file temp.md

A call to "sed" can remove the 2 first lines and the mark.

```
sed -i '1,2d' temp.md
sed -i -e 's/abc/XYZ/g' temp.md
```

A "magic" call to perl can insert external text files. It is proposed by stackoverflow ie Embedding one markdown document in another

```
perl -ne 's/^!\[\[(.+?)\]\].*/`cat $1`/e;print' temp.md > filename.md
```

All the found ![[textfilepath]] in temp.md will be replaced by the textfilepath file content in result.md

This method can be applied to subpart of the file like the header to get more compact script or any other text file to share like a bash file.

Finally the markdown image is exported to pdf with pandoc

```
pandoc -s -o filename.pdf filename.md
```

The intermediate files temp.md, filename.md are delated. The filename.md may be kept for debug or further operation; for that comment the line "rm…" in the bash file.

There are probably more interesting options of pandoc to use… This will be another task

-[] TODO explore pandoc to pdf options.

2.4 What is missing for the magic complete

2.4.1 Code to be added

Some code lines are added to prepare the structure : a directory "py2pdf_files" is created to store the output files.

A local print function allows to print in the console and in a logfile. The logfile name is changed when necessary to separate the output. Inspiration for this comes from stackoverflow print on console and text file simultaneously python

Some code is also needed to store the desired matplotlib graphs.

The command lines are embedded in a bash file called at the end of the script. In this example the bash file is in the same directory than the python script. For a more productive configuration, the bash file might be located in one directory, an alias added in ".bashrc". The call to script is then :

```
py2pdf scriptname
```

"py2pdf" being the alias.

Then in the ".bashrc" file :

```
# my scripts
p="$HOME/0_myscripts/" # or any other path to your scripts
alias py2pdf="$p/py2pdf"
```

2.4.2 Resources

- pandoc : pandoc.org
- python, bash, perl : standard of Linux distribution?

2.4.3 Github repository

The files are under Github Homeswinghome/py2pdf

2.5 What does the python script looks like ?

Some lines from scriptpython2pdf.py :

```
#!/usr/bin/env python3
# -*- coding: utf-8 -*-

#~~ ---
#~~ title : Automatic pdf report from a python script with pandoc
#~~ author : ChristianV
#~~ date : 14 Oct 2022
#~~ abstract : Export a pdf report (code, outputs) commented with the Markdown embedded in the python s
#~~ lang: en-US
#~~ geometry:
#~~ - margin = 2cm
#~~ - a4paper
#~~ toc: true
#~~ toc_depth: 2
#~~ numbersections: true
#~~ links-as-notes: false
#~~ linkcolor: blue
#~~ ---
#~~
#~~ # Which problem does this solve?
#~~
#~~ To have the possibility to make a report
#~~..../
#Some more lines here
#~~./...
#~~ Some code is also needed to store the desired matplotlib graphs.
#~~
#~~ The command lines are embedded in a bash file called at the end of the script. In this example the
#~~ ```
#~~ py2pdf scriptname
#~~ ```
#~~ "py2pdf" being the alias.
```

```
#~~
#~~ Then in the ".bashrc" file :
#~~ ```bash
#~~ # my scripts
#~~ p="$HOME/0_myscripts/" # or any other path to your scripts
#~~ alias py2pdf="$p/py2pdf"
#~~ ```
#~~
#~~ ### Resources
#~~ * pandoc : [pandoc.org](https://pandoc.org/)
#~~ * python, bash, perl : standard of Linux distribution?
#~~
#~~ # python code
#~~
#~~ ## Import modules
#~~ ```python

# import
import os # for py2pdf
import matplotlib.pyplot as plt # for the demo
import numpy as np # for the demo
#~~ ```
#~~
#~~ ## Functions
#~~
#~~ This is a demo file. In other applications, for a better readability, those specific functions migh
#~~ ```python

def print_twice(log,*args,**kwargs):
    # the double print function (to console and to log)
    print(*args,**kwargs)
    with open(log,"a") as f:  # appends to file and closes it when finished
        print(file=f,*args,**kwargs)
#~~..../
#Some more lines here
#~~./...
#~~ ```
#~~ ## Main code
#~~
#~~ ### Code section 1
#~~ ```python
# lines to be included for py2pdf export
scriptname = os.path.basename(__file__).split('.')[0] # get this script file name without extension
logfile = "./py2pdf_files/log1.txt" # define the logfile
outputdir() # create the directory to store the output
clearlog(logfile) # clear the logfile (in case script is ran several times)

# code for console output demo
path = os.getcwd() # get the path of the current directory
print_twice(logfile, "Path of the current directory : " + path)
print_twice(logfile, "python script name : ",scriptname)
print_twice(logfile, "Directory content :")
print_twice(logfile, "\n".join(os.listdir(path)))
print_twice(logfile, "Logfile : ", logfile)
#~~ ```
#~~ ### Code Output (section 1)
#~~ ```
#~~ ![[./py2pdf_files/log1.txt]]
#~~ ```
#~~..../
#Some more lines here
```

```
#~~./...
# prepare the command to launch the report creation
cmd = "./py2pdf.sh " + scriptname

# code for console output demo
print_twice(logfile, "launch command : ",cmd) # for demo
print_twice(logfile, "pdf should be available soon") # for demo
# launch the report creation
os.system(cmd) # to launch the bash file (copy, preprocessing, pandoc to pdf)
```

3 python code

3.1 Import modules

```
# import
import os # for py2pdf
import matplotlib.pyplot as plt # for the demo
import numpy as np # for the demo
```

3.2 Functions

This is a demo file. In other applications, for a better readability, those specific functions might be included in a library to import in the above section.

```
def print_twice(log,*args,**kwargs):
    # the double print function (to console and to log)
    print(*args,**kwargs)
    with open(log,"a") as f:  # appends to file and closes it when finished
        print(file=f,*args,**kwargs)

def outputdir():
    # create a directory to save outputs
    directory = "py2pdf_files"
    if not os.path.exists(directory):
        # print("create directory")
        os.makedirs(directory)
    else:
        pass
        # print("existing directory")

def clearlog(log):
    # clear logfile
    file_to_delete = open(log,'w')
    file_to_delete.close()
```

3.3 Main code

3.3.1 Code section 1

```
# lines to be included for py2pdf export
scriptname = os.path.basename(__file__).split('.')[0] # get this script file name without extension
logfile = "./py2pdf_files/log1.txt" # define the logfile
outputdir() # create the directory to store the output
clearlog(logfile) # clear the logfile (in case script is ran several times)

# code for console output demo
path = os.getcwd() # get the path of the current directory
print_twice(logfile, "Path of the current directory : " + path)
print_twice(logfile, "python script name : ",scriptname)
print_twice(logfile, "Directory content :")
print_twice(logfile, "\n".join(os.listdir(path)))
print_twice(logfile, "Logfile : ", logfile)
```

3.3.2 Code Output (section 1)

```
Path of the current directory : /home/christian/py2pdf
python script name :  scriptpython2pdf
Directory content :
scriptpython2pdf_extract.py
py2pdf.sh
DMLmaterial4.py
scriptpython2pdf.py
scriptpython2pdf.pdf
py2pdf_files
Logfile :  ./py2pdf_files/log1.txt
```

3.3.3 Code section 2

From matplotlib site : Simple plot This simple example plots the signal :

$$s = 1 + sin(2.\pi.t)$$

```
# code for matplotlib output demo
# Data for plotting
t = np.arange(0.0, 2.0, 0.01)
s = 1 + np.sin(2 * np.pi * t)
fig, ax = plt.subplots()
ax.plot(t, s)
ax.set(xlabel='time (s)', ylabel='voltage (mV)',
       title='About as simple as it gets, folks')
ax.grid()
fig.savefig("./py2pdf_files/simple_plot.png") # this is the key line to store the matplotlib output
plt.show()
```

3.3.4 Code Output (section 2)

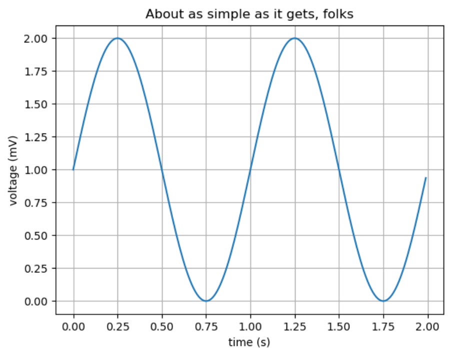


Figure 1: matplotlib output

3.3.5 Code last section

```
# lines to be included for py2pdf export
# create a second logfile
logfile = "./py2pdf_files/loglast.txt" # define the logfile
clearlog(logfile) # clear the logfile (in case script is ran several times)
# prepare the command to launch the report creation
cmd = "./py2pdf.sh " + scriptname

# code for console output demo
print_twice(logfile, "launch command : ",cmd) # for demo
print_twice(logfile, "pdf should be available soon") # for demo
# launch the report creation
os.system(cmd) # to launch the bash file (copy, preprocessing, pandoc to pdf)
```

/!\WARNING : no output after this line can be recorded automatically

```
print("Hurra the pdf is created!")
```

3.3.6 Code output (last section)

```
launch command :  ./py2pdf.sh scriptpython2pdf
pdf should be available soon
```

3.3.7 Code of the bash file

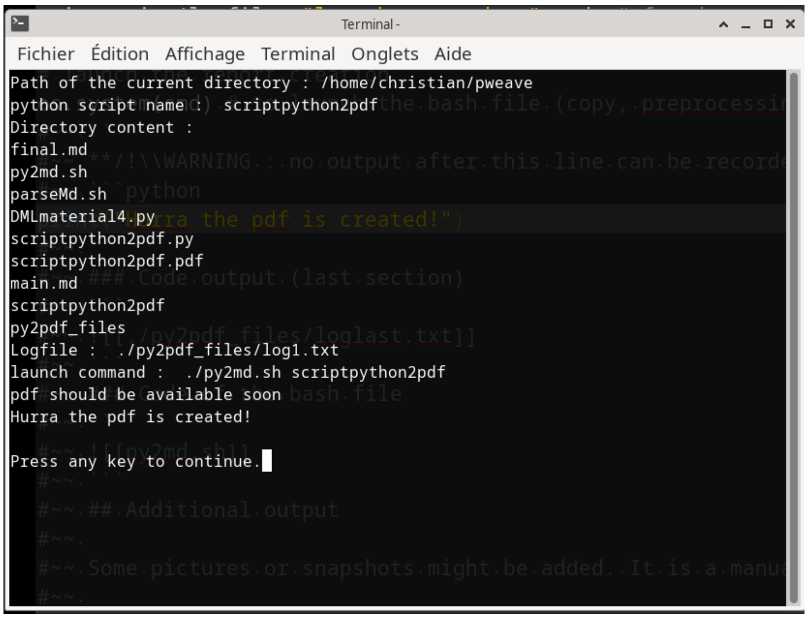
py2pdf.sh

```
#!/bin/bash
ext1=".py"
ext2=".md"
ext3=".pdf"
scriptfile=$1$ext1
mdcopy=$1$ext2
pdfout=$1$ext3
cp $scriptfile temp.md
sed -i '1,2d' temp.md
sed -i -e 's/#~~ //g' temp.md
perl -ne 's/^!\[\[(.+?)\]\].*/`cat $1`/e;print' temp.md > $mdcopy
pandoc -s -o $pdfout $mdcopy

rm temp.md
rm $mdcopy
```

3.4 Additional output

Some pictures or snapshots might be added. It is a manual operation to store them.



```
Path of the current directory : /home/christian/pweave
python script name : scriptpython2pdf
Directory content :
final.md
py2md.sh
parseMd.sh
DMLmaterial4.py
scriptpython2pdf.py
scriptpython2pdf.pdf
main.md
scriptpython2pdf
py2pdf_files
Logfile :  ./py2pdf_files/log1.txt
launch command :  ./py2md.sh scriptpython2pdf
pdf should be available soon
Hurra the pdf is created!

Press any key to continue.
```

Figure 2: terminal

End of the python script