Files, Errors and Warnings of `pythontex` 0.18

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1 Introduction

This document is created with `lualatex` or that like with output format pdf. The package `tex4ht` is not loaded.

The `pythontex` package together with the auxiliary program with the same name `pythontex`, allows including code, e.g. in Python into a LaTeX document. This document describes the input/output behavior of the auxiliary program `pythontex`, version 0.18 which includes all files read and written and uses pythontex. For example, `1+1=2` has been computed by python.

Interaction of `pythontex` with a LaTeX-to-pdf converter like `lualatex` is comparable to that of other auxiliary programs like `makeindex`: A latex package makes the LaTeX-to-pdf converter extract information for the auxiliary program into a separate file or more. Then the auxiliary program is run which creates further files which the LaTeX-to-pdf converter reads in a second run.

Both, the package `pythontex` and the auxiliary programs `pythontex` and `depythontex`, are described in [Poo21]. Moreover, there is an introduction [Poo] and a gallery [Poo17]. For background on the intentions of package `pythontex`, consult [Poo15].

The integration of `pythontex` into the latex maven plugin in this project is given in [Rei], Section 5.5.

Another source of knowledge on pythontex is the source code hosted at `https://github.com/gpoore/pythontex`.

At least the following properties are special to package `pythontex`:

- The number of files `pythontex` may create is variable and so by default they are put into a subfolder.
- The output files generated are highly configurable.
- There is more than one auxiliary program tied to the package, besides `pythontex` also `depythontex`.
- The errors and warnings of a `pythontex` run and of a `depythontex` run are not written into a log file.

In [Rei], Section 5.5 a wrapper for `pythontex` is suggested writing the errors and warnings normally coming at standard output or error output into a log file `xxx.plg`. Nevertheless, currently no log file is written.

The package `pythontex` is highly configurable, more than this software allows. Thus, also in this document we assume that neither `\setpythontexoutputdir` setting the output directory nor `\setpythontexworkingdir` setting the working directory are used, because this software assumes the default that the working directory is the directory containing the LaTeX main file `xxx.tex` and the output directory is in the working directory and its name is `pythontex-files-xxx`.

Note that we assume python 3.x is installed only.

2 The converter pythontex

As already pointed out in the introduction, we restrict ourselves to the default case in which pythontex writes output files only in folder pythontex-files-xxx.

Under these assumptions, Figure 1 shows the input and output files of pythontex.

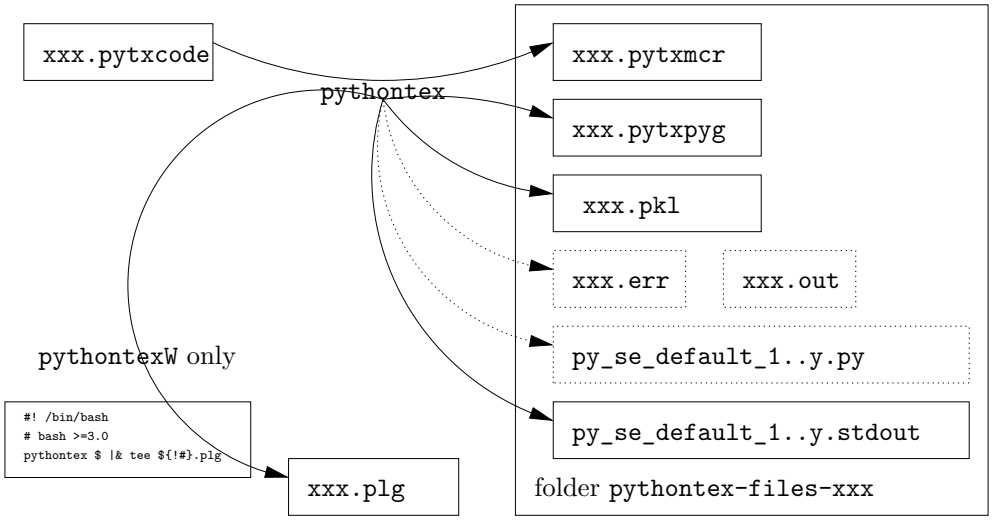

Figure 1: Conversion of a pytxcode-file using pythontex

The input file is described in Section 2.1 in full detail. Section 2.2 is devoted to the output files of pythontex. Note that unlike the wrapper pythontexW, the original pythontex just prints errors and warnings. These are all collected in Section 2.3. Finally, Section 2.4 is on the failure codes.

2.1 The Input File xxx.pytxcode

If a file xxx.tex loading package pythontex is processed, as is the case for this document, a file xxx.pytxcode is created, whether there is python code within xxx.tex or not. This file contains a line

```
=>PYTHONTEX:SETTINGS#
```

and below that are specified the package options in the form given by Listing 1.

There is one key which does not refer to a package option: it is version which refers to the version of the pythontex package which is also the expected version of pythontex. If the versions deviate, running pythontex emits the fatal error with line number 491 in Table 1.

Interesting: runall is a package option, but it is not a valid key in xxx.pytxcode: instead, runall=true/false is converted into rerun=always/default. Note that pythontex is not able to process the key runall but emits a warning with line number 484 given in Table 3. This document is compiled with option runall=false.

For each python code in xxx.tex, there is a separate code section in xxx.pytxcode. The code sections come in proper order and precede the settings section. This document has a single section with pythoncode, right at the beginning of the introduction. The code is

```
\pys[sname]{1+1=!{1+1}}
```

```
=>PYTHONTEX:SETTINGS#
version=0.18
outputdir=pythontex-files-pythontexInOut
workingdir=.
workingdirset=false
gobble=none
rerun=default
hashdependencies=default
makestderr=false
stderrfilename=full
keeptemps=all
pyfuture=default
pyconfuture=none
pygments=false
pygglobal=:GLOBAL||
fvextfile=55
pyconbanner=none
pyconfilename=stdin
depythontex=true
```

Listing 1: The settings section of `pythontexInOut.pytxcode`

```
=>PYTHONTEX#py#sname#default#0#s#####142#
1+1=!{1+1}
```

Listing 2: The sole code section of `pythontexInOut.pytxcode`

Listing 2 shows the according section in `xxx.pytxcode`. As always there is a headline starting with `=>PYTHONTEX` then follow, separated by `#` symbols

- the family, i.e. the interpreter, here `py` representing python, coming from the command `\pys`; accordingly for environments,
- the session, here `sname`, which is the optional parameter of the command,
- next suspected the restart identifier, seemingly always `default`
- the command, here `s`, also determined by the command `\pys`,
- the context which is empty,
- arguments which are empty here,
- the number of the instance, which runs from 0 to the number of commands minus one
- and the line number which is the line in the LaTeX file, where the command or the according environment starts.

If running `pythontex` on the job `xxx`, we obtain for this manual with a trailing empty line.

```
This is PythonTeX 0.18

-------------------------------------------------
PythonTeX:  manualLatexMavenPlugin - 0 error(s), 0 warning(s)
```

The folder `pythontex-files-manualLatexMavenPlugin` is created but may be empty because there is no code.

2.2 The Output Files

Figure 1 shows that the output files of `pythontex` are all in folder `pythontex-files-xxx`. Temporary files in dotted boxes, so these can be seen only if the `pythontex` run is interrupted, e.g. by failure. The other files are called *final*. The Figure also indicates, that the wrapper `pythontexW` writes a log file in addition.

Among the final files, there is `xxx.pytxmcr` which starts something like

```
%Last time of file creation:  1656851667.5282867
```

and contains processed pygments code according to [Poo21], page 107.

Although indicates the time of the last `pythontex` wrote the file, seemingly, `pythontex` does not update if it is unchanged. So it does not indicate the last run.

2.3 Errors and Warnings at standard/error output

Line No	*	Message	RC
219	-	`Invalid --interpreter argument`	2
246	y	`You have launched PythonTeX using pythontex2/3.py directly.`	2
271	y	`You have launched PythonTeX using pythontex2/3.py directly.`	2
292	y	`Code file xxx.pytxcode does not exist. Run LaTeX …`	1
327	y	`Directory naming collision between the following files:…`	1
362	y	`Code file xxx.pytxcode does not exist.Run LaTeX …`	1
370	-	`The .pytxcode file appears to have an outdated format or be invalid Run LaTeX to make sure the file is current`	1
406	y	`Unable to parse package option fvextfile.`	1
491	y	`The version of the PythonTeX scripts does not match the last code saved by the document--run LaTeX to create an updated version.`	1
2864			1

Table 1: Fatal errors of `pythontex`

Fatal errors are those which exit directly with an error code other than 0. They cannot be suppressed via command line option `--error-exit-code`; this refers to the non-fatal errors only which cause error code 1 if the option is set to `true`. If such a non-fatal error occurs, and The proper error message always starts with `* PythonTeX error`.

Line No	*	Message	inc err
655	y	Cannot find dependency …	yes
1359	y	Currently, non-Python consoles are not supported	yes
1605	y	Missing output file for …	yes
1611	y	Running code for Julia console failed	yes
1696	y	Cannot find dependency. It belongs to …	yes
1765	y	Missing stderr file for …	yes
1960	y	Line number xxx could not be synced with the document …	yes
2343	y	An error occurred but no error messages were identified. …	yes
2422	y	Could not find external file xxx The file was not pygmentized	no

Table 2: Non-fatal errors of `pythontex`

The non fatal errors go into the error count displayed at the end of the log. To this number also errors from the python run are added.

Line No	*	Message	inc warn
340	y	Potential directory naming collision …	yes
413	y	Invalid value for package option fvextfile	yes
484	y	Unknown option …	yes
685	y	Session xxx has rerun=never	yes
		But its code or dependencies have been modified	
1446	y	The following have dependencies that have been modified	yes
1737	y	Custom code for xxx attempted to print or write to stdout	yes

Table 3: Warnings of `pythontex`

Line Number	*	Message
2276	y	Line number xxx could not be synced with the document
2336	y	x message(s) could not be classified
		Interpreted as y, based on the return code(s)

Table 4: Notices of `pythontex`

2.4 Failure codes

3 The converter `depythontex`

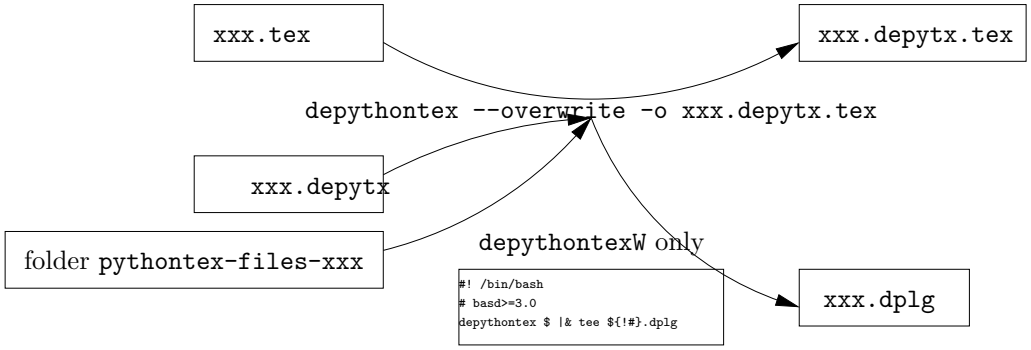

Figure 2: Conversion of a `depytx`-file using `depythontex`

3.1 The Input File `xxx.dpytx`

3.2 The Output Files

3.3 Errors and Warnings at standard/error output

3.4 Failure codes

4 References

[Poo] Geoffrey M. Poore. PythonTEX Quickstart. `https://github.com/gpoore/pythontex/blob/master/pythontex_quickstart/pythontex_quickstart.pdf`.

[Poo15] Geoffrey M. Poore. PythonTeX: reproducible documents with LaTeX, Python, and more. *Computational Science & Discovery*, 8(1), 7 2015. doi:10.1088/1749-4699/8/1/014010.

[Poo17] Geoffrey M. Poore. PythonTEX Gallery. `https://github.com/gpoore/pythontex/blob/master/pythontex_gallery/pythontex_gallery.pdf`, 7 2017.

[Poo21] Geoffrey M. Poore. *The pythontex package*. gpoore at gmail.com, `github.com/gpoore/pythontex`, v1.8 edition, 6. 2021.

[Rei] E. Reißner. *Manual for the latex-maven-plugin and for an according ant-task, Version X.Y.* available at `http://www.simuline.eu/LatexMavenPlugin/manualLatexMavenPlugin.pdf`.