LaTeX Environments to Image Format

v1.9 — 2020-08-22*

CTAN: https://www.ctan.org/pkg/ltximg
https://github.com/pablgonz/ltximg

Abstract

`ltximg` is a `perl` *script* that automates the process of extracting and converting environments provided by TikZ, PStricks and other packages from ⟨*input file*⟩ to image formats and standalone files using `ghostscript` and `poppler-utils`. Generates a file with only extracted environments and another with all extracted environments converted to `\includegraphics`.

Contents

1 License

2 Motivation and Acknowledgments

The original idea was to extend the functionality of the `pst2pdf`[9] script to work with `tikzpicture` and other environments. The TikZ[2] package allows to *externalize* the environments, but, the idea was to be able to extend this to *any type* of environment covering three central points:

1. Generate a separate image files for environments.
2. Generate a standalone files with only the extracted environments.
3. Generate a file replacing the environments by `\includegraphics`.

From the side of TEX there are some packages that cover several of these points such as the preview[1], xcomment[12], extract[13] and cachepic[14] packages among others, but none covered all points.

In the network there are some solutions in `bash` that were able to extract and convert environments, but in general they presented problems when the document contained *"verbatim style"* code or were only available for `Linux`.

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Analysed the situation the best thing was to create a new *"script"* that was able to cover the three points and was multi platform, the union of all these ideas is born **ltximg**.

This script would not be possible without the great work of Herbert Voß author of pst2pdf[1] and Heiko Oberdiek author of pdfcrop[2]. Several parts of the code have been taken and adapted from both scripts.

3 Requirements for operation

For the complete operation of **ltximg** you need to have a modern TEX distribution such as TEX Live or MiKTEX, have a version equal to or greater than 5.28 of perl, a version equal to or greater than 9.24 of ghostscript, a version equal to or greater than 1.40 of pdfcrop and have a version equal to or greater than 0.52 of poppler-utils. The distribution of TEX Live 2020 for Windows includes **ltximg** and all requirements, MiKTEX users must install the appropriate software for full operation.

The script auto detects the ghostscript, but not poppler-utils. You should keep this in mind if you are using the script directly and not the version provided in your TEX distribution.

The script has been tested on Windows (v10) and Linux (fedora 32) using ghostscript v9.52, poppler-utils v0.84, perl v5.30 and the standard classes offers by LATEX: book, report, article and letter. The preview[1] and pst-pdf[5] packages are required to process the ⟨*input file*⟩ and if an ⟨*output file*⟩ is generated, the graphicx[10] and grfext[11] packages will be needed.

4 How it works

It is important to have a general idea of how the *"extraction and conversion"* process works and the requirements that must be fulfilled so that everything works correctly, for this we must be clear about some concepts related to how to work with the ⟨*input file*⟩, the ⟨*verbatim content*⟩ and the ⟨*steps process*⟩.

4.1 The input file

The ⟨*input file*⟩ must comply with *certain characteristics* in order to be processed, the content at the beginning and at the end of the ⟨*input file*⟩ is treated in a special way, before \documentclass and after \end{document} can go any type of content, internally the script will *"split"* the ⟨*input file*⟩ at this points.

If the ⟨*input file*⟩ contains files using \input{⟨*file*⟩} or \include{⟨*file*⟩} these will not be processed, from the side of the *script* they only represent lines within the file, if you want them to be processed it is better to use the latexpand[3] first and then process the file.

Like \input{⟨*file*⟩} or \include{⟨*file*⟩}, blank lines, vertical spaces and tab characters are treated literally, for the *script* the ⟨*input file*⟩ is just a set of characters, as if it was a simple text file. It is advisable to format the source code ⟨*input file*⟩ using utilities such as chktex[4] and latexindent[5], especially if you want to extract the source code of the environments.

Both \thispagestyle{⟨*style*⟩} and \pagestyle{⟨*style*⟩} are treated in a special way by the script, if they do not appear in the preamble then \pagestyle{⟨*empty*⟩} will be added and if they are present and {⟨*style*⟩} is different from {⟨*empty*⟩} this will be replaced by {⟨*empty*⟩}.

This is necessary for the image creation process, it does not affect the ⟨*output file*⟩, but it does affect the *standalone* files. For the script the process of dividing the ⟨*input file*⟩ into four parts and then processing them:

```
% Part One: Everything before \documentclass
\documentclass{article}
% Part two: Everything between \documentclass and \begin{document}
\begin{document}
% Part three: : Everything between \begin{document} and \end{document}
\end{document}
% Part Four: Everything after \end{document}
```

If for some reason you have an environment filecontens before \documentclass or in the preamble of the ⟨*input file*⟩ that contains a *sub-document* or *environment* you want to extract, the script will ignore them. Similarly, the content after \end{document} is ignored in the extraction process.

[1] https://ctan.org/pkg/pst2pdf
[2] https://ctan.org/pkg/pdfcrop
[3] https://www.ctan.org/pkg/latexpand
[4] https://www.ctan.org/pkg/chktex
[5] https://www.ctan.org/pkg/latexindent

4.2 Verbatim contents

One of the greatest capabilities of this script is to *"skip"* the complications that ⟨*verbatim content*⟩ produces with the extraction of environments using tools outside the "TEX world"[6]. In order to *"skip"* the complications, the ⟨*verbatim content*⟩ is classified into three types:

- Verbatim in line.
- Verbatim standard.
- Verbatim write.

Verbatim in line

The small pieces of code written using a *"verbatim macro"* are considered ⟨*verbatim in line*⟩, such as `\verb|`⟨*code*⟩`|` or `\verb*|`⟨*code*⟩`|` or `\macro{`⟨*code*⟩`}` or `\macro[`⟨*opts*⟩`]{`⟨*code*⟩`}`.

Most *"verbatim macro"* provide by packages minted[18], fancyvrb[16] and listings[17] have been tested and are fully supported. They are automatically detected the *verbatim macro* (including `*` argument) generates by `\newmint` and `\newmintinline` and the following list:

- `\mint`
- `\spverb`
- `\qverb`
- `\fverb`
- `\verb`
- `\Verb`
- `\lstinline`
- `\pyginline`
- `\pygment`
- `\Scontents`
- `\tcboxverb`
- `\mintinline`

Some packages define abbreviated versions for *"verbatim macro"* as `\DefineShortVerb`, `\lstMakeShortInline` and `\MakeSpecialShortVerb`, will be detected automatically if are declared explicitly in ⟨*input file*⟩.

The following consideration should be kept in mind for some packages that use abbreviations for verbatim macros, such as shortvrb[15] or doc[15] for example in which there is no explicit `\macro` in the document by means of which the abbreviated form can be detected, for automatic detection need to find `\DefineShortVerb` explicitly to process it correctly. The solution is quite simple, just add in ⟨*input file*⟩:

```
\UndefineShortVerb{\|}
\DefineShortVerb{\|}
```

depending on the package you are using. If your *"verbatim macro"* is not supported by default or can not detect, use the options described in 7.2 and 7.3.

Verbatim standard

These are the *"classic"* environments for *"writing code"* are considered ⟨*verbatim standard*⟩, such as `verbatim` and `lstlisting` environments. The following list (including `*` argument) is considered as ⟨*verbatim standard*⟩ environments:

- `Example`
- `CenterExample`
- `SideBySideExample`
- `PCenterExample`
- `PSideBySideExample`
- `verbatim`
- `Verbatim`
- `BVerbatim`
- `LVerbatim`
- `SaveVerbatim`
- `PSTcode`
- `LTXexample`
- `tcblisting`
- `spverbatim`
- `minted`
- `listing`
- `lstlisting`
- `alltt`
- `comment`
- `chklisting`
- `verbatimtab`
- `listingcont`
- `boxedverbatim`
- `demo`
- `sourcecode`
- `xcomment`
- `pygmented`
- `pyglist`
- `program`
- `programl`
- `programL`
- `programs`
- `programf`
- `programsc`
- `programt`

They are automatically detected ⟨*verbatim standard*⟩ environments (including `*` argument) generates by commands:

- `\DefineVerbatimEnvironment`
- `\NewListingEnvironment`
- `\DeclareTCBListing`
- `\ProvideTCBListing`
- `\lstnewenvironment`
- `\newtabverbatim`
- `\specialcomment`
- `\includecomment`
- `\newtcblisting`
- `\NewTCBListing`
- `\newverbatim`
- `\NewProgram`
- `\newminted`

If any of the ⟨*verbatim standard*⟩ environments is not supported by default or can not detected, you can use the options described in 7.2 and 7.3.

[6] Only TEX can understand TEX, all other languages and programs are just lines in a file.

Verbatim write

Some environments have the ability to write *"external files"* or *"store content"* in memory, these environments are considered ⟨*verbatim write*⟩, such as `scontents`, `filecontents` or `VerbatimOut` environments. The following list is considered (including `*` argument) as ⟨*verbatim write*⟩ environments:

- `scontents`
- `filecontents`
- `tcboutputlisting`
- `tcbexternal`
- `tcbwritetmp`
- `extcolorbox`
- `extikzpicture`
- `VerbatimOut`
- `verbatimwrite`
- `filecontentsdef`
- `filecontentshere`
- `filecontentsdefmacro`
- `filecontentsdefstarred`
- `filecontentsgdef`
- `filecontentsdefmacro`
- `filecontentsgdefmacro`

They are automatically detected ⟨*verbatim write*⟩ (including `*` argument) environments generates by commands:

- `\renewtcbexternalizetcolorbox`
- `\renewtcbexternalizeenvironment`
- `\newtcbexternalizeenvironment`
- `\newtcbexternalizetcolorbox`
- `\newenvsc`

If any of the ⟨*verbatim write*⟩ environments is not supported by default or can not detected, you can use the options described in 7.2 and 7.3.

4.3 Steps process

For creation of the image formats, extraction of source code of environments and creation of an ⟨*output file*⟩, **`ltximg`** need a various steps. Let's assume that the ⟨*input file*⟩ is `test.tex`, ⟨*output file*⟩ is `test-out.tex`, the working directory are "`./`", the directory for images are `./images`, the temporary directory is `/tmp` and we want to generate images in `pdf` format and ⟨*standalone*⟩ files for all environments extracted.

We will use the following code as `test.tex`:

```
% Some commented lines at begin file
\documentclass{article}
\usepackage{tikz}
\begin{document}
Some text
\begin{tikzpicture}
  Some code
\end{tikzpicture}
Always use \verb|\begin{tikzpicture}| and \verb|\end{tikzpicture}| to open
and close environment
\begin{tikzpicture}
  Some code
\end{tikzpicture}
Some text
\begin{verbatim}
\begin{tikzpicture}
  Some code
\end{tikzpicture}
\end{verbatim}
Some text
\end{document}
Some lines that will be ignored by the script
```

Validating Options

The first step is read and validated [⟨*options*⟩] from the command line and `test.tex`, verifying that `test.tex` contains *some* environment to extract, check the name and extension of `test-out.tex`, check the directory `./images` if it doesn't exist create it and create a temporary directory `/tmp/hG45uVklv9`.

The entire `test.tex` file is loaded into memory and *"split"* to start the extraction process.

Comment and ignore

In the second step, once the file test.tex is loaded and divided in memory, proceeds (in general terms) as follows:

> Search the words \begin{ and \end{ in verbatim standard, verbatim write, verbatim in line and commented lines, if it finds them, converts to \BEGIN{ and \END{, then places all code to extract inside the \begin{preview} ...\end{preview}.

At this point *"all"* the code you want to extract is inside \begin{preview}...\end{preview}.

Creating files and extracting

In the third step, the script generate ⟨*standalone*⟩ files: test-fig-1.tex, test-fig-2.tex, ... and saved in ./images then proceed in two ways according to the [⟨*options*⟩] passed to generate a temporary file with a random number (1981 for example):

1. If script is call *without* --noprew options, the following lines will be added at the beginning of the test.tex (in memory):

```
\PassOptionsToPackage{inactive}{pst-pdf}%
\AtBeginDocument{%
\RequirePackage[inactive]{pst-pdf}%
\RequirePackage[active,tightpage]{preview}%
\renewcommand\PreviewBbAdjust{-60pt -60pt 60pt 60pt}}%
% rest of input file
```

   The different parts of the file read in memory are joined and save in a temporary file test-fig-1981.tex in "./". This file will contain all the environments for extraction between \begin{preview}...\end{preview} along with the rest of the document. If the document contains images, these must be in the formats supported by the *engine* selected to process the ⟨*input file*⟩.

2. If script is call *with* --noprew options, the \begin{preview}...\end{preview} lines are only used as delimiters for extracting the content *without* using the package preview, the following lines will be added at the beginning of the test.tex (in memory):

```
\PassOptionsToPackage{inactive}{pst-pdf}%
\AtBeginDocument{%
\RequirePackage[inactive]{pst-pdf}}%
% only environments extracted
```

   Then it is joined with all extracted environments separated by \newpage and saved in a temporary file test-fig-1981.tex in "./".

If --norun is passed, the temporary file test-fig-1981.tex is renamed to test-fig-all.tex and moved to ./images.

Generate image formats

In the fourth step, the script generating the file test-fig-1981.pdf with all code extracted and croping, running:

```
[user@machine ~:]$ ⟨compiler⟩ -no-shell-escape -interaction=nonstopmode -recorder test-fig-1981.tex
[user@machine ~:]$ pdfcrop --margins 0 test-fig-1981.pdf test-fig-1981.pdf
```

Now move test-fig-1981.pdf to /tmp/hG45uVklv9 and rename to test-fig-all.pdf, generate image files test-fig-1.pdf and test-fig-2.pdf and copy to ./images, if the image files exist, they will be rewritten each time you run the script. The file test-fig-1981.tex is moved to the ./images and rename to test-fig-all.tex.

Note the options passed to ⟨*compiler*⟩ always use -no-shell-escape and -recorder, to generate the .fls file which is used to delete temporary files and directories after the process is completed. The --shell option activates -shell-escape for compatibility with packages such as minted or others.

Create output file

In the fifth step, the script apply the option --clean, remove all content betwen %<*remove> ... %</remove> and try to detect whether the graphicx package and the \graphicspath command are in the preamble of the ⟨*output file*⟩ (in memory). If it is not possible to find it, it will read the .log file generated by the temporary file with only preamble. Once the detection is complete, the package grfext and \PrependGraphicsExtensions* will be added at the end of the preamble:

```
\usepackage{graphicx}
\graphicspath{{images/}}
\usepackage{grfext}
\PrependGraphicsExtensions*{.pdf}
```

Now converting all extracted code to `\includegraphics` and save `test-out.tex` in "`./`", then proceed to run:

```
[user@machine ~:]$ ⟨compiler⟩ -recorder -shell-escape test-out.tex
```

generating the file `test-out.pdf`.

Clean temporary files and dirs

In the sixth step, the script read the files `test-fig-1981.fls` and `test-out.fls`, extract the information from the temporary files and dirs generated in the process in "`./`" and then delete them together with the directory `/tmp/hG45uVklv9`.

Finally the output file `test-out.tex` looks like this:

```
% some commented lines at begin document
\documentclass{article}
\usepackage{tikz}
\graphicspath{{images/}}
\usepackage{grfext}
\PrependGraphicsExtensions*{.pdf}
\begin{document}
Some text
\includegraphics[scale=1]{test-fig-1}
Always use \verb|\begin{tikzpicture}| and \verb|\end{tikzpicture}| to open
and close environment
\includegraphics[scale=1]{test-fig-2}
Some text
\begin{verbatim}
\begin{tikzpicture}
  Some code
\end{tikzpicture}
\end{verbatim}
Some text
\end{document}
```

5 Extract content

The script provides two ways to ⟨*extract*⟩ content from ⟨*input file*⟩, using ⟨*environments*⟩ and ⟨*docstrip tags*⟩. Some environment (including `*` argument) are supported by default. If environments are nested, the outermost one will be extracted.

5.1 Default environments

`\begin{preview}` ⟨*env content*⟩ `\end{preview}`

Environment provide by preview[1] package. If any `preview` environments found in the ⟨*input file*⟩ will be extracted and converted these. Internally the script converts all environments to extract in `preview` environments. Is better comment this package in preamble unless the option `-n`,`--noprew` is used. This environment is reserved for the internal process of extraction and conversion, it cannot be passed as an argument to the option `--skipenv`.

`\begin{postscript}` ⟨*env content*⟩ `\end{postscript}`

Environment provide by pst-pdf[5], auto-pst-pdf[6] and auto-pst-pdf-lua[7] packages. Since the pst-pdf, auto-pst-pdf and auto-pst-pdf-lua packages internally use the preview package, is better comment this in preamble. Only the *content* of this environment is extracted and *"not"* the environment itself when using the `--srcenv` or `--subenv` options.

`\begin{PSTexample}` ⟨*env content*⟩ `\end{PSTexample}`

Environment provide by pst-exa[8] packages. The script automatically detects the `\begin{PSTexample} ...\end{PSTexample}` environments and processes them as separately compiled files. The user should have loaded the package with the [swpl] or [tcb] option and run the script using `--latex` or `--xetex`. This environment is reserved for the internal process of extraction and conversion, it cannot be passed as an argument to the option `--skipenv`.

`\begin{pspicture}` ⟨*env content*⟩ `\end{pspicture}`

Environment provide by PStricks[3] package. The plain TeX syntax `\pspicture ... \endpspicture` its converted to LaTeX syntax `\begin{pspicture} ... \end{pspicture}` if not within the `PSTexample` or `postscript` environments.

`\begin{psgraph}` ⟨*env content*⟩ `\end{psgraph}`

Environment provide by pst-plot[4] package. The plain TeX syntax `\psgraph ... \endpsgraph` its converted to LaTeX syntax `\begin{psgraph} ... \end{psgraph}` if not within the `PSTexample` or `postscript` environments.

\begin{tikzpicture}
⟨env content⟩
\end{tikzpicture}

Environment provide by TikZ[2] package. The plain TeX syntax `\tikzpicture ... \tikzpicture` its converted to LaTeX syntax `\begin{tikzpicture} ... \end{tikzpicture}` but no a short syntax `\tikz ... ;`.

\begin{pgfpicture}
⟨env content⟩
\end{pgfpicture}

Environment provide by pgf[2] package. Since the script uses a *"recursive regular expression"* to extract environments, no presents problems if present `pgfinterruptpicture`.

If you need to extract other environments you can use one of the options described in 7.2 or 7.3.

5.2 Extract with docstrip tags

%<*ltximg>
⟨content⟩
%</ltximg>

All content included between `%<*ltximg> ... %</ltximg>` is extracted. The tags can *not* be nested and should be at the beginning of the line and in separate lines. Internally the script converts all this tags to `preview` environments.

```
% no space before open tag %<*
%<*ltximg>
code to extract
%</ltximg>
% no space before close tag %</
```

5.3 Prevent extraction and remove

Sometimes you do not want to *"extract all"* the environments from ⟨*input file*⟩ or you want to remove environments or arbitrary content. The script provides a convenient way to solve this situation.

\begin{nopreview}
⟨env content⟩
\end{nopreview}

Environment provide by preview package. Internally the script converts all *"skip"* environments to `\begin{nopreview} ... \end{nop` Is better comment this package in preamble unless the option `-n,--noprew` is used. This environment is reserved for the internal process of extraction and conversion, it cannot be passed as an argument to the option `--extrenv`.

%<*noltximg>
⟨content⟩
%</noltximg>

All content betwen `%<*noltximg> ... %</noltximg>` are ignored and no extract. The tags can *not* be nested and should be at the beginning of the line and in separate lines. Internally the script converts all this tags to `nopreview` environments.

```
% no space before open tag %<*
%<*noltximg>
no extract this
%</noltximg>
% no space before close tag %</
```

%<*remove>
⟨content⟩
%</remove>

All content betwen `%<*remove> ... %</remove>` are deleted in the ⟨*output file*⟩. The tags can *not* be nested and should be at the beginning of the line and in separate lines.

```
% no space before open tag %<*
%<*remove>
lines removed in output file
%</remove>
% no space before close tag %</
```

The content will be deleted if it is *"not"* within a ⟨*verbatim*⟩ or ⟨*verbatim write*⟩ environment. If you want to remove specific environments automatically you can use one of the options described in 7.2 or 7.3.

6 Image Formats

The ⟨*image formats*⟩ generated by the **ltximg** using `ghostscript` and `poppler-utils` are the following command lines:

pdf The image format generated using `ghostscript`. The line executed by the system is:

```
[user@machine ~:]$ gs -q -dNOSAFER -sDEVICE=pdfwrite -dPDFSETTINGS=/prepress
```

eps The image format generated using `pdftoeps`. The line executed by the system is:

```
[user@machine ~:]$ pdftops -q -eps
```

png The image format generated using `ghostscript`. The line executed by the system is:

```
[user@machine ~:]$ gs -q -dNOSAFER -sDEVICE=pngalpha -r150
```

jpg The image format generated using `ghostscript`. The line executed by the system is:

```
[user@machine ~:]$ gs -q -dNOSAFER -sDEVICE=jpeg -r150 -dJPEGQ=100 \
                      -dGraphicsAlphaBits=4 -dTextAlphaBits=4
```

ppm The image format generated using pdftoppm. The line executed by the system is:

```
[user@machine ~:]$ pdftoppm -q -r 150
```

tiff The image format generated using ghostscript. The line executed by the system is:

```
[user@machine ~:]$ gs -q -dNOSAFER -sDEVICE=tiff32nc -r150
```

svg The image format generated using pdftocairo. The line executed by the system is:

```
[user@machine ~:]$ pdftocairo -q -r 150
```

bmp The image format generated using ghostscript. The line executed by the system is:

```
[user@machine ~:]$ gs -q -dNOSAFER -sDEVICE=bmp32b -r150
```

7 How to use

7.1 Syntax

The syntax for **ltximg** is simple, if your use the version provided in your TEX distribution:

```
[user@machine ~:]$ ltximg [⟨options⟩] [--] ⟨input file⟩
```

If the development version is used:

```
[user@machine ~:]$ perl ltximg [⟨options⟩] [--] ⟨input file⟩
```

The extension valid for ⟨*input file*⟩ are .tex or .ltx, relative or absolute paths for files and directories is not supported. If used without [⟨*options*⟩] the extracted environments are converted to pdf image format and saved in the ./images directory using pdflatex and preview package.

7.2 Command line interface

The script provides a *command line interface* with short - and long -- option, they may be given before the name of the ⟨*input file*⟩, the order of specifying the options is not significant. Options that accept a ⟨*value*⟩ require either a blank space ␣ or = between the option and the ⟨*value*⟩. Multiple short options can be bundling and if the last option takes a ⟨*comma separated list*⟩ you need -- at the end.

-h, --help ⟨*bolean*⟩ (default: off)

Display a command line help and exit.

-l, --log ⟨*bolean*⟩ (default: off)

Write a ltximg.log file with all process information.

-v, --version ⟨*bolean*⟩ (default: off)

Display the current version (1.9) and exit.

-V, --verbose ⟨*bolean*⟩ (default: off)

Show verbose information of process in terminal.

-d, --dpi ⟨*integer*⟩ (default: 150)

Dots per inch for images files. Values are positive integers less than or equal to 2500.

-t, --tif ⟨*bolean*⟩ (default: off)

Create a .tif images files using ghostscript.

-b, --bmp ⟨*bolean*⟩ (default: off)

Create a .bmp images files using ghostscript.

-j, --jpg ⟨*bolean*⟩ (default: off)

Create a .jpg images files using ghostscript.

-p, --png ⟨*bolean*⟩ (default: off)

Create a .png transparent image files using ghostscript.

-e, --eps ⟨*bolean*⟩ (default: off)

Create a .eps image files using pdftops.

-s, --svg ⟨*bolean*⟩ (default: off)

Create a `.svg` image files using `pdftocairo`.

-P, --ppm ⟨*bolean*⟩ (default: off)

Create a `.ppm` image files using `pdftoppm`.

-g, --gray ⟨*bolean*⟩ (default: off)

Create a gray scale for all images using `ghostscript`. The line behind this options is:

```
[user@machine ~:]$ gs -q -dNOSAFER -sDEVICE=pdfwrite -dPDFSETTINGS=/prepress        \
                      -sColorConversionStrategy=Gray -dProcessColorModel=/DeviceGray
```

-f, --force ⟨*bolean*⟩ (default: off)

Try to capture `\psset{`⟨*code*⟩`}` and `\tikzset{`⟨*code*⟩`}` to extract. When using the `--force` option the script will try to capture `\psset{`⟨*code*⟩`}` or `\tikzset{`⟨*code*⟩`}` and leave it inside the `preview` environment, any line that is between `\psset{`⟨*code*⟩`}` and `\begin{pspicture}` or between `\tikzset{`⟨*code*⟩`}` and `\begin{tikzpicture}` will be captured.

-n, --noprew ⟨*bolean*⟩ (default: off)

Create images files without preview package. The `\begin{preview}...\end{preview}` lines are only used as delimiters for extracting the content *without* using the package preview. Using this option *"only"* the extracted environments are processed and not the whole ⟨*input file*⟩, sometimes it is better to use it together with `--force`.

-m, --margins ⟨*integer*⟩ (default: 0)

Set margins in bp for `pdfcrop`.

-r, --runs ⟨`1|2|3`⟩ (default: 1)

Set the number of times the ⟨*compiler*⟩ will run on the ⟨*input file*⟩ for environment extraction.

-o, --output ⟨*file name*⟩ (default: empty)

Create ⟨*file name*⟩ with all extracted environments converted to `\includegraphics`. Only ⟨*file name*⟩ must be passed *without* relative or absolute paths.

--prefix ⟨*string*⟩ (default: fig)

Set ⟨*prefix*⟩ append to each generated files.

--myverb ⟨*macro name*⟩ (default: myverb)

Set custom verbatim command `\myverb`. Just pass the ⟨*macro name*⟩ *without* "`\`".

--imgdir ⟨*string*⟩ (default: images)

Set the name of directory for save generated files. Only the ⟨*name*⟩ of directory must be passed *without* relative or absolute paths.

--zip ⟨*bolean*⟩ (default: off)

Compress the files generated by the script in `./images` in `.zip` format. Does not include ⟨*output file*⟩.

--tar ⟨*bolean*⟩ (default: off)

Compress the files generated by the script in `./images` in `.tar.gz` format. Does not include ⟨*output file*⟩.

--srcenv ⟨*bolean*⟩ (default: off)

Create separate files with *"only code"* for all extracted environments. This option is mutually exclusive with `--subenv`.

--subenv ⟨*bolean*⟩ (default: off)

Create a ⟨*standalone*⟩ files (with *"preamble and code"*) for all extracted environments. This option is designed to generate *"compilable files"* for each extracted environment, is mutually exclusive with `--srcenv`.

--shell ⟨*bolean*⟩ (default: off)

Enable `\write18`⟨*shell command*⟩.

--norun ⟨*bolean*⟩ (default: off)

Execute the script, but do not create image files. This option is designed to be used in conjunction with `--srcenv` or `--subenv` and to debug the ⟨*output file*⟩.

--nopdf ⟨*bolean*⟩ (default: off)

Don't create a `.pdf` image files.

--nocrop ⟨*bolean*⟩ (default: off)

Don't run `pdfcrop` in image files.

`--arara` ⟨*bolean*⟩ (default: off)

Use `arara`[7] tool for compiler ⟨*input file*⟩ and ⟨*output file*⟩. This option is designed to full process ⟨*input file*⟩ and ⟨*output file*⟩, is mutually exclusive with *"any"* other ⟨*compiler*⟩ option. See 8 for more information.

`--xetex` ⟨*bolean*⟩ (default: off)

Using `xelatex` compiler ⟨*input file*⟩ and ⟨*output file*⟩.

`--latex` ⟨*bolean*⟩ (default: off)

Using `latex»dvips»ps2pdf` compiler in ⟨*input file*⟩ and `pdflatex` for ⟨*output file*⟩.

`--dvips` ⟨*bolean*⟩ (default: off)

Using `latex»dvips»ps2pdf` for compiler ⟨*input file*⟩ and ⟨*output file*⟩.

`--dvilua` ⟨*bolean*⟩ (default: off)

Using `dvilualatex»dvips»ps2pdf` for compiler ⟨*input file*⟩ and `lualatex` for ⟨*output file*⟩.

`--dvipdf` ⟨*bolean*⟩ (default: off)

Using `latex»dvipdfmx` for compiler ⟨*input file*⟩ and ⟨*output file*⟩.

`--latexmk` ⟨*bolean*⟩ (default: off)

Using `latexmk`[8] for process ⟨*output file*⟩. This option is designed to full process ⟨*output file*⟩, is mutually exclusive with `--arara`.

`--luatex` ⟨*bolean*⟩ (default: off)

Using `lualatex` for compiler ⟨*input file*⟩ and ⟨*output file*⟩.

`--clean` ⟨`doc|pst|tkz|all|off`⟩ (default: doc)

Removes specific content in ⟨*output file*⟩. Valid values for this option are:

`doc` All content after `\end{document}` is removed.
`pst` All `\psset{`⟨*code*⟩`}` and PStricks package is removed in ⟨*preamble*⟩ and ⟨*body*⟩.
`tkz` All `\tikzset{`⟨*code*⟩`}` is removed in ⟨*body*⟩.
`all` Activates `doc`, `pst` and `tkz`.
`off` Deactivate all.

`--extrenv` ⟨*comma separated list*⟩ (default: empty)

Add environments to extract, if it's the last option passed need `--` at the end. The environments `document` and `nopreview` are not supported in this option.

`--skipenv` ⟨*comma separated list*⟩ (default: empty)

Add environments that should *"not be extracted"* and that the script supports by default, if it's the last option passed need `--` at the end. The environments `PSTexample` and `preview` are not supported in this option.

`--verbenv` ⟨*comma separated list*⟩ (default: empty)

Add ⟨*verbatim standard*⟩ environment support, if it's the last option passed need `--` at the end.

`--writenv` ⟨*comma separated list*⟩ (default: empty)

Add ⟨*verbatim write*⟩ environment support, if it's the last option passed need `--` at the end.

`--deltenv` ⟨*comma separated list*⟩ (default: empty)

Add environments to deleted in ⟨*output file*⟩. The environments are delete only in ⟨*body*⟩ of ⟨*output file*⟩, if it's the last option passed need `--` at the end. The environment `document` is not supported in this option.

Passing options from command line

An example of usage from command line:

```
[user@machine ~:]$ ltximg --latex -s -o test-out  test-in.ltx
```

Create a `./images` directory (if it does not exist) with all extracted environments converted to image formats (`pdf`, `svg`) in individual files, an output file ⟨*test-out.ltx*⟩ with all extracted environments converted to `\includegraphics` and a single file ⟨*test-in-fig-all.ltx*⟩ with only the extracted environments using `latex»dvips»ps2pdf` and `preview` package for for process ⟨*test-in.ltx*⟩ and `pdflatex` for ⟨*test-out.ltx*⟩.

[7] https://ctan.org/pkg/arara
[8] https://www.ctan.org/pkg/latexmk

7.3 Options from input file

Many of the ideas in this section are inspired by the arara. A very useful way to pass options to the script is to place them in commented lines at the beginning of the file, very much in the *"style of* arara*"*.

`% ltximg:` ⟨*argument*⟩`:` {⟨*option one, option two, option three, ...*⟩}

`%!ltximg:` ⟨*argument*⟩`:` {⟨*option one, option two, option three, ...*⟩}

The vast majority of the ⟨*options*⟩ can be passed into the ⟨*input file*⟩. These should be put at the beginning of the file in commented lines and everything must be on the same line, the exclamation mark `!` deactivates the ⟨*options*⟩. When passing options from the ⟨*input file*⟩ you should be aware that they must *"not"* contain `-` or `--`, the `=` sign between an option and its value is mandatory, short names are disabled and options found in the ⟨*input file*⟩ overwrite those passed on the command line. Valid values for ⟨*argument*⟩ are the following:

`% ltximg: extrenv:` {⟨*environment one, environment two, environment three, ...*⟩}

This line is to indicate to the script which environments, not supported by default, are extracted.

`% ltximg: skipenv:` {⟨*environment one, environment two, environment three, ...*⟩}

This line is to indicate to the script which environments, of the ones supported by default, should not be extracted.

`% ltximg: verbenv:` {⟨*environment one, environment two, environment three, ...*⟩}

This line is to indicate to the script which environments, its considerate a ⟨*verbatim standard*⟩.

`% ltximg: writenv:` {⟨*environment one, environment two, environment three, ...*⟩}

This line is to indicate to the script which environments its consider ⟨*verbatim write*⟩.

`% ltximg: deltenv:` {⟨*environment one, environment two, environment three, ...*⟩}

This line is to indicate to the script which environments are deleted.

`% ltximg: options:` {⟨*option one = value, option two = value, option three = value, ...*⟩}

This line is to indicate to the script which options(other than those listed above) need to process.

The options passed from the ⟨*input file*⟩ are validated by the script after they are read. If you are going to create an ⟨*output file*⟩ and you do not want these lines to remain, it is better to place them inside the `%<*remove> ... %</remove>`. Like this:

```
%<*remove>
% ltximg: options: { png, srcenv, xetex }
% ltximg: extrenv: { description }
%</remove>
```

Passing options from input file

Adding the following lines to the beginning of the file `file-in.tex`:

```
% ltximg: options: { luatex, output = file-out, imgdir = pics, prefix = env }
% ltximg: skipenv: { tikzpicture }
% ltximg: deltenv: { filecontents }
```

and run:

```
[user@machine~:]$ ltximg file-in.tex
```

Create a `./pics` directory (if it does not exist) with all extracted environments, except `tikzpicture`, converted to image formats (`pdf`) in individual files, an output file ⟨*file-out.tex*⟩ with all extracted environments converted to `\includegraphics` and environment `filecontents` removed, a single file ⟨*file-in-env-all.ltx*⟩ with *only* the extracted environments using `lualatex` and preview package for process ⟨*file-in.tex*⟩ and ⟨*file-out.tex*⟩.

8 The way of arara

By design, the script only runs *"one or more compilation"* on top of the ⟨*input file*⟩, but, sometimes you need to process in a specific mode the ⟨*input file*⟩ or needs to be processed with something other than LaTeX, XeLaTeX, pdfLaTeX or LuaLaTeX engine. This is where arara[19] comes in, this *"great little tool"*, is able to have complete control over the compilation of the ⟨*input file*⟩, we just have to keep a few considerations in mind:

1. Read the documentation (this always comes first).
2. Add `{ options: [-recorder] }` to "rule" for clean temporary files.
3. Avoiding the use of `: clean: { extensions: [...] }`.
4. Don't set `-jobname` and `-output-directory` in any "rule".

When the `--arara` option is passed to the script, the line that runs in the system is:

```
[user@machine~:]$ arara --log file.tex
```

If you have several "rules" within the file they will all be executed, to avoid this we must add:

```
% arara: halt
```

After the last "rule" you have at the beginning of the file. With all these considerations in mind it is possible to extract and convert environments from *any file*.

For example, by adding these lines at the beginning of the file:

```
% arara: lualatex: { options: [-recorder] }
% arara: lualatex: { options: [-recorder] }
%<*remove>
% ltximg: options: { arara, output = file-out, prefix = tkz}
%</remove>
```

and run:

```
[user@machine~:]$ ltximg test.tex
```

Create a `./images` directory (if it does not exist) with all extracted environments converted to image format (`pdf`) in individual files, an output file ⟨*file-out.tex*⟩ with all exatracted environments converted to `\includegraphics`, a single file ⟨*test-tkz-all.tex*⟩ with only the extracted environments using preview package and `lualatex` *"two times"* for process ⟨*test.tex*⟩ and ⟨*file-out.tex*⟩.

Remember that the ⟨*input file*⟩ and ⟨*output file*⟩ will be compiled using the same "rule". One *trick* to get around this situation is to use:

```
%<*remove>
% arara: lualatex: { options: [-recorder] }
% arara: lualatex: { options: [-recorder] }
% arara: halt
% ltximg: options: { arara, output = file-out, prefix = tkz}
%</remove>
% arara: xelatex: { options: [-recorder] }
% arara: xelatex: { options: [-recorder] }
```

The content betwen `%<*remove> ... %</remove>` are remove from output file before compiling. Thus, the output file ⟨*file-out.tex*⟩ will be compiled using `xelatex` *"two times"*.

As a final consideration, **`ltximg`** passes options to the preview package and the `pdfcrop` script according to the engine used. When using `--arara` it will *"try"* to detect the used engine by means of a regular expression, if the detection fails the default values will be used.

This does not affect the process of creating ⟨*standalone*⟩ files and can be prevented by using `--noprew` or `--nocrop` at the cost of not having the images cropped.

In this way we can ⟨*compile*⟩ and ⟨*convert*⟩ any document as long as the conditions of the ⟨*input file*⟩ are met and the correct "rule" are used.

9 Example usign latexmk

If you are a user of latexmk, another great utility that automates the compilation process, you must keep in mind that this will run only in the ⟨*output file*⟩. Consider the following example adapted from How to get tikzmark to work and Draw an aircraft with Tikz to generate an image in svg, png and pdf format from environment picture using lualatex and latexmk.

```
%<*remove>
% ltximg: extrenv: {picture}
% ltximg: skipenv: {tikzpicture}
%</remove>
\documentclass{article}
\usepackage{tikz}
\usetikzlibrary{calc,tikzmark}
\setlength{\parindent}{0pt}
\begin{document}
\section{How to get Tikzmark to work}
By taking logarithms of both sides:

\[
  t = \frac{30\cdot\ln(3/22)}{\ln(15/22)}
  \tikzmark{calculator}\approx\tikzmark{otherside}
    156
\]
\begin{tikzpicture}[overlay,remember picture]
  \coordinate (target) at ($(pic cs:calculator)!1/2!(pic cs:otherside) - (0,.5ex)$);
  \draw[arrows=->] (target) ++(0,-2ex) node [anchor=north] {use calculator} -- (target);
\end{tikzpicture}

\section{Draw an aircraft with Tikz}
The best airplane ever drawn by David Carlise. No TikZ used, just the
classic and perhaps forgotten \verb|\begin{picture} ... \end{picture}|.

\begin{picture}(200,100)
  \put(30,40){\line(1,0){150}}  \put(30,40){\line(0,1){60}}
  \put(30,100){\line(1,0){20}}  \put(50,100){\line(1,-4){10}}
  \put(60,60){\line(1,0){100}}  \put(160,60){\line(1,-1){20}}
  \put(100,50){\line(0,-1){80}} \put(130,50){\line(0,-1){80}}
  \put(100,-30){\line(1,0){30}} \put(100,61){\line(0,1){49}}
  \put(130,61){\line(0,1){49}}  \put(100,110){\line(1,0){30}}
\end{picture}
\end{document}
```

We now run:

```
[user@machine~:]$ ltximg --luatex --latexmk --svg --png -o file-out file-in.tex
```

Create a ./images directory (if it does not exist) with all picture environments, except tikzpicture, converted to image formats (svg, png, pdf), an output file ⟨*file-out.tex*⟩ with all picture environments converted to \includegraphics, a single file ⟨*file-in-fig-all.ltx*⟩ with only environments picture extracted using lualatex and preview package for process ⟨*file-in.tex*⟩ and latexmk for *full* process ⟨*file-out.tex*⟩.

10 Note for dvisvgm users

By design, the image format svg is created using pdftocairo over the generated pdf file, but, if you want to have a good svg files that preserve our *typographic* fonts it is best to use dvisvgm[9]. The best results of dvisvgm[20] are obtained when processing the file in .dvi or .xdv format, there are two possible ways to do this:

1. Execute the script using --subenv and --norun to generate ⟨*standalone*⟩ files, move to ./images and generate .dvi or .xdv files, then runing:

   ```
   [user@machine~:]$ for i in *.tex; do ⟨compiler⟩ [⟨options⟩] $i;done
   [user@machine~:]$ for i in *.dvi; do dvisvgm [⟨options⟩] $i;done
   ```

2. Execute the script using --norun, move to ./images and generate .dvi or .xdv file, then runing:

[9] https://ctan.org/pkg/dvisvgm

```
[user@machine~:]$ ⟨compiler⟩ [⟨options⟩] test-fig-all.tex
[user@machine~:]$ dvisvgm [⟨options⟩] test-fig-all.dvi
```

11 Final notes

The process and operations required to generate the various types of ⟨*image formats*⟩ or ⟨*standalone*⟩ files have been described throughout the documentation, but, as discussed in section 8, sometimes the requirements are a *little different*.

This is the best way to extend the capabilities of the **ltximg**. Although many tasks can be *automated*, in the end only the user knows what the document contains and how it should be generated.

Finding the correct *"regular expressions"* and writing a *"good documentation"* would be the great mission (which does not end yet).

12 Change history

The most recent publicly released of **ltximg** is available at CTAN: https://www.ctan.org/pkg/ltximg. Historical and developmental versions are available at https://github.com/pablgonz/ltximg.

While general feedback via email is welcomed, specific bugs or feature requests should be reported through the issue tracker: https://github.com/pablgonz/ltximg/issues.

This is a short list of some of the notable changes in the history of the **ltximg** along with the versions, both development (devp) and public (ctan).

v1.9 (ctan), 2020-08-22
- Fix `graphicx` detection.
- Fix typos in documentation.
- Add more contents to `.log` file.

v1.8 (ctan), 2020-08-18
- It is now possible to extract any environment.
- Add `--log`, `--runs`, `--latexmk` and `--dvilua` options.
- All calls to the system are captured.
- Re-write source code acording to `Perl` v5.3x.
- Review of documentation.

v1.7 (ctan), 2019-08-24
- Add `scontents` environment support.
- Add `filecontentsdefmacro` environment support.
- Fix regex in source code.
- Update documentation.

v1.6 (ctan), 2019-07-13
- Add `--zip` and `--tar` options.
- Add new `Verb` from `fvextra`.
- Fix and update source code and documentation.

v1.5 (ctan), 2018-04-12
- Use `GitHub` to control version.
- Rewrite and optimize most part of source code and options.
- Change `pdf2svg` for `pdftocairo`.
- Complete support for `pst-exa` package.
- Escape characters in regex according to `Perl` v5.2x.

v1.4 (devp), 2016-11-29
- Remove and rewrite code for regex and system call.
- Add `--arara` compiler, clean and comment code.
- Add `--dvips` and `--dvipdfm(x)` for creation images.
- Add `bmp`, `tiff` image format.

v1.3 (devp), 2016-08-14
- Rewrite some part of code (norun, nocrop, clean).
- Suport `minted` and `tcolorbox` package.
- Escape some characters in regex according to `Perl` v5.2x.
- All options read from command line and input file.
- Use `/tmp` dir for work process.

v1.2 (ctan), 2015-04-22
- Remove unused modules.
- Add more image format.
- Fix regex.

v1.1 (ctan), 2015-04-21
- Change `mogrify` to `gs` for image formats.
- Create output file.
- Rewrite source code and fix regex.
- Change format date to iso format.

v1.0 (ctan), 2013-12-01
- First public release.

13 References

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14 Index of Documentation

The italic numbers denote the pages where the corresponding entry is described.