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A \LaTeX package to draw pixel-art pictures

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This package defines macros to draw pixel-art pictures using Lual-TeX.

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Part I.

Introduction

Installation instruction are given in section 3. Documentation about how to use this package (and examples) is given in part II. Most of the examples has been gathered in appendix A.

1. Note to non-LuaLTFX users

Unfortunately, package pixelart does not works with LATEX or XeLATEX. If you cannot or don't want to use LuaLATEX, you can:

- use the previous, unmaintained version of pixelart, named pixelart0, and included with this package;
- or, better, use pxpic.

2. License

This work may be distributed and/or modified under the conditions of the LATEX Project Public License, either version 1.3 of this license or (at your option) any later version.

3. Installation

3.1. Gnu/Linux Distribution

If applicable, the easiest way to get pixelart working is by installing it by your distribution package. In Debian (and Ubuntu, and surely other distributions that inherit from Debian) it is packaged in texlive-pictures since version 2017.20180103-1. So you can install it by running:

sudo apt install texlive-pictures

3.2. LaTeX distribution

This package is included both in TeXLive and MiKTeX. It can be installed using their respective package managers.

3.3. Manual installation

• Download the lastest archive :

Stable version https://mirrors.ctan.org/graphics/pgf/contrib/pixelart.zip
Development version https://framagit.org/spalax/pixelart/repository/archive.
 zip?ref=main

- Unzip the archive.
- Move files pixelart.sty and pixelart.lua into a LATEX path.

Part II.

Usage

4. Package options

The package accepts a single option.

draft

Loading the package with this options is equivalent to using option draft on every single call of command \pixelart (or \tikzpixelart). If your document contains a lot of those commands, using this option can speed up compilation. For instance, on my outdated computer, compilation of this document takes about 11 seconds with this option, and more than 16 seconds without.

See option draft (page 4) for more information.

5. Drawing pictures

```
\operatorname{pixelart}[\langle options \rangle] \{\langle pixels \rangle\}
```

This is the basic command to draw pixel-art. Its mandatory argument is a sequence of pixels, as characters which will be turned into colored squares (using a tikzpicture, from Till Tantau's TikZ). Its basic usage is given in figure 1 (page 4).

In argument $\{\langle pixels \rangle\}$, dots. are converted to transparent pixels, spaces and line breaks delimit pixel rows, and any character defines a color, depending on option colors.

More information is given in section 5.1.

nixels

The art, as a list of pixels. See section 5.1.

```
colors = \{\langle options \rangle\}
```

Pixel colors. See section 5.2.

```
I \pixelart[
          tikz={
2
3
            red,
             scale=.05,
4
            baseline=.3em,
5
          }
6
       ]{
7
          ..11..11..
8
                                                     🖊 IAT<sub>F</sub>X
          .11111111.
9
          1111111111
10
          1111111111
11
          1111111111
12
          .11111111.
13
          ..111111..
14
15
          ...1111...
          . . . . 11 . . . .
16
       } \LaTeX
17
```

FIGURE 1: Basic example

draft = true|false

Disable rendering of \pixelart and \tikzpixelart commands: on documents containing a lot of thoses commands, this can speed up compilation. The pixel art is replaced by a dummy drawing, which takes the same space as the pixel art it replaces.

This option can be applied to every single \pixelart or \tikzpixelart of the document by using \usepackage[draft]{pixelart}.

See an example in A.5.

$margin = \langle length \rangle$

Pixel-art pictures are *enclosed* inside a tikz \clip command. Most of the time, you won't notice it, but when playing with options style or tikz, your picture might extend outside usual borders, and part of it might be clipped out. Use the margin option to extend the clip area. See example A.13.

squares

If set, each pixel is drawn using a separate \fill command (more in section 5.3). This option is incompatible with stack (see section 5.5).

stack

If set, pixelart will try to draw several adjacent pixels of the same color using a single **\fill** command (more in section 5.4). This option is incompatible with **squares** (see section 5.5).

```
style = \langle keyword\rangle
Default: pixelart
```

Pixels are drawn using \fill commands in a tikzpicture environment. Those \fill commands are applied the pixelart style by default (as in: \fill[pixelart] (0, 0) rectangle (1, 1); You can set another style by using this command. See an example in A.6.

```
tikz = \{\langle options \rangle\}
```

A pixel art is a bunch of \fill commands in a tikzpicture. Arguments to this option are passed as-is as optional arguments to the tikzpicture environment. See examples in A.7.

You will probably use this option to make the pixel art smaller (it is, by default, probably bigger than what you want), and to change the baseline. See figure 1 for an example.

Note that a \clip command, which does not accept arguments, is used to delimit the picture. So you might get an error if your tikz option applies to \clip commands (for instance, by using every path/.style=bla bla bla, which would apply to the \clip command, and would raise an error). In such cases, you might want to use option style instead (see page 5).

```
\tikzpixelart[\langle options \rangle] \{\langle coord \rangle\} \{\langle pixels \rangle\}
```

Use this command if you want to draw pixel art pictures *inside* a tikzpicture environment

The $[\langle options \rangle]$ and $\{\langle pixels \rangle\}$ arguments have the same meaning as the corresponding arguments to the \pixelart command (excepted for tikz, which is passed as is as the argument of a scope environment). The $\{\langle coord \rangle\}$ is the coordinate of the bottom left corner of the pixel art. It is passed as is in a TikZ scope environment (\begin{scope}[shift={<coord>}]), so you can use anything that will be correctly parsed by TikZ.

See examples in section A.10.

5.1. Pixels

Pixels are defined as blocks of characters. Dots always represent transparent pixels, and spaces and line breaks always separate pixel rows. Then, other caracters encode different colors, depending on option colors.

Let us analyse the following example.

```
1 \pixelart[
2  colors=RGB, tikz={scale=.4}
3 ]{
4  {yellow}GB
5  G.R
6  BR{}
7 }
```

• The first row {yellow}GB means: one yellow pixel, one green pixel, one blue pixel.

5. Drawing pictures

- The second row G.R means: one green pixel, one transparent pixel, one red pixel.
- The last row BR{} means: one blue pixel, one red pixel, one pixel using the default TikZ color (that is, a \fill command is used to draw this pixel, without any color option, which means the default TikZ color is used; see option tikz, page 5).

Note that:

- Line breaks and consecutive spaces are considered as a *single* row separation. That is, the previous example could also have been written as {yellow}B G.R BR{}.
- New paragraph are not allowed inside a $\{\langle pixels \rangle\}$ argument.
- If rows do not have the same length (the same number of pixels), transparent pixels are added at the end of the small rows.

Examples for the previous corner cases are given in section A.1.

Most of commands are expanded *before* being passed as an argument to <page-header> so it is possible to use commands inside a $\substack{\text{pixelart},\\ \text{for an example}.}$ argument. See section A.2 for an example.

5.2. Colors

In a \pixelart command, pixel colors can be defined explicitly, or using keys/values.

Explicit Any text surrounded by braces is transmitted as-is to the underlying tikzpicture. That way, you can use anything you would use with TikZ (which itself uses xcolor): red, red!20, red!20!purple, any user-defined color, or {}, which does not give any color argument to the \fill command used to draw this pixel, thus using default TikZ color (see option tikz, page 5).

Key/Value Any alphanumeric character (a to z, A to Z, 0 to 9) not surrounded by braces is a key, which encodes the corresponding color defined in the colors argument. For instance, if colors is given as colors={R={red},G={green}}, then, having RG in the {\psi pixels\} argument is equivalent to {red}{green}.

Using non-alphanumeric characters as keys of **colors** is not supported: it might work, but it is an undefined behaviour.

The following examples illustrates this option.

• Key/values:

5. Drawing pictures

```
1 \pixelart[
2 colors={R=red, G=green, B=blue}
3 ]{
4 RG
5 GB
6 }
7
```

• Explicit:

```
1 \pixelart{
2     {cyan}{magenta}
3     {yellow}{black}
4 }
5
```

• Mix:

```
1 \pixelart[
2 colors={R=red, G=green, B=blue}
3 ]{
4 RG
5 {yellow}B
6 }
7
```

If you use the same setting several times, you can define it once for all using \newpixelartcolors.

$\newpixelartcolors{\langle name \rangle} {\langle key/value \rangle}$

Once a color set has been defined, to use it, simply use its name as an argument to colors instead of the whole keys/values. See an example in A.3.

name

Name of your color set.

key/value

Your color set, as keys/values.

$\rule = \rule = \rul$

The previous command will fail if a color set $\{\langle name \rangle\}$ is already defined. This command will always succeed, whether a color set $\{\langle name \rangle\}$ already exists or not.

5. Drawing pictures

The following key/value settings are predefined (examples are given in A.4).

explicit: No keys/values: pixel colors have to be explicitely defined.

```
1 \newpixelartcolors{explicit}{}
2
```

RGB: Define the primary colors red, green, blue, as well as black and white.

BW: Black and white.

```
1  \newpixelartcolors{BW}{
2    0=white,
3    1=black,
4   }
5
```

gray: Gray scale: 0 is white, 9 is black, and digits 0 to 9 are a gray scale from white to black.

```
1  \newpixelartcolors{gray}{
2    0=white,
3    1=white!89!black,
4    2=white!78!black,
5    3=white!67!black,
6    4=white!56!black,
7    5=white!44!black,
8    6=white!33!black,
```



FIGURE 2: Artifacts appearing with option squares : the white lines should not exist.

```
9 7=white!22!black,
10 8=white!11!black,
11 9=black,
12 }
```

mono: Monochromatic: any character encodes the default TikZ color (black by default, may be changed with options tikz or style).

5.3. More about option squares

When using squares, each pixel is a separate colored square. Thus, artifacts can appear when viewing the document, as illustrated in figure 2.

To remove those artifacts, you can (1) use option stack instead (see section 5.4), or (2) use option overlap.

```
overlap = \langle number \rangle
```

Assuming the square width is 1, $\{\langle number \rangle\}$ is the size of the overlap: how much a square overlaps over the next one. With a positive number, the artifact (white line between two pixels) will disappear as the adjacent pixels are merged.

Note that using a negative value to overlap is also allowed, and will separate each pixel from its neighbour, giving a the look of a LCD screen.

See examples in section A.9.

6. Default options

	mono	Drawing concentric	checker			
pixelart0	243					
pixelart stack	2.9	4.4	158			
pixelart squares	245	263	252			
(a) File size (kB)						
		Drawing				
	mono	concentric	checker			
pixelart0	38.7					
pixelart stack	1.0	1.0	24.4			

(b) Compilation time (seconds)

28.3

19.9

27.1

FIGURE 3: Benchmark: pixelart0 vs. stack vs squares

5.4. More about option stack

If option stack is set, pixelart tries to merge adjacent pixels of the same color, to draw them at once. Thus, it mostly remove the artifacts problem discussed with option squares (although it may still occur).

Example in section A.8 shows how different color shapes are stacked onto each other to produce the pixel art.

5.5. Which option: squares or stack?

Which option should you use: squares or stack?

pixelart squares

To compare the different algorithms, three files have been compiled, each with one big pixel art command (see example A.11), with three different algorithms: outdated package pixelart0, and options stack and squares of pixelart. The result can be seen in figure 3 (page 10).

Unless you want to use option overlap of option squares (see section 5.3), you probably want to use option stack:

- it is faster (see benchmark);
- it produces smaller files (see benchmark);
- it mostly remove artifacts.

Thus, the stack option is the default one used by pixelart.

6. Default options

You can use the following command to define options once for all.

$\strut = \strut \{ \langle options \rangle \}$

Any options defined here will affect later \pixelart or \tikzpixelart commands, unless those options are explicitly set.

See example in section A.12.

7. Logos

If you want to credit pixelart in a fancy way, you can use one of those logos. Apart from being gorgeous, they include a transparent text (so that they are searchable and copyable) and they scale with the current font size.

\pixelartlogo

Pixel♥Art Name and heart, in color.

\pixelartheart

Weart only, in color.

\pixelartname

PixelArt Name only, in color.

\pixelartlogobw

Pixel Art Name and heart, black and white.

\pixelartheartbw

• Heart only, black and white

\pixelartnamebw

PixelArt Name only, black and white.

8. Debugging

What if drawing your pixel art throws an error?

- 1. Standard output prints one % pixelart 2, file ./foo.tex, input line 19 per \pixelart or \tikzpixelart command. If compilation failed right after this line, look at the given file: the \pixelart command might be wrong.
- 2. If you do not see the problem, set debug mode on.

\setpixelartdebugon

Set debug on.

\setpixelartdebugoff

Set debug off.

Using those commands, the following piece of information will be logged:

- the parsed options of \pixelart and \tikzpixelart;
- the $\{\langle pixels \rangle\}$ argument of those commands;
- the tikz commands used to draw the picture;
- and maybe some other stuff I forgot.

Note that you can have as many \setpixelartdebugon and \setpixelartdebugoff commands as you want, even if debug is already on or off.

A good idea is to copy the tikz commands that are logged (those are the commands used to draw the pixel art), and paste them in a new file. Try to compile it. Are some of your arguments at fault? Bad value for the tikz option can produce faulty tikz code.

3. Still no idea why your \pixelart command fails? Seek help on your usual places, or report a bug.

Part III.

Appendix

A. Examples

A.1. Corner cases of $\langle pixels \rangle$ argument

• Line breaks and multiple spaces are considered as a *single* row separation.

• Multiple line breaks (new paragraphs) are not supported: at best, they do not give the expected result; at worst, compilation will fail.

```
1 \pixelart{
2    .1
3    1.
4 }
5 \pixelart{
6    .1
7
8    1.
9 }
```

• Empty pixels are automatically added at the end of shorter lines.

```
1  \pixelart{
2    1
3    .1
4    1.1
5  }
6  \pixelart{
7    1..
8    .1.
9    1.1
10 }
```

A.2. Commands inside $\pixelart{\langle pixels \rangle}$ argument

If we are too lazy to repeat every single pixel to draw a checker board, we can use commands.

Example 1: Each couple of lines is repeted four times.

Example 2: \foreach outside \pixelart

```
\gdef\board{}
       \gdef\line{1}
2
       \foreach \j in \{1, \ldots, 3\}{
3
         \xdef\line{\line.1}
4
5
       \foreach \i in \{1, \ldots, 4\}{
6
7
         \xdef\board{%
           \board
8
           \line.
9
            .\line.
10
         }
11
12
       \pixelart{\board}
13
14
```

Example 3: I do not understand LATEX enough to explain why, however, \foreach inside a \pixelart does not work.

```
1  \pixelart{
2   \foreach \i in {1, ..., 8}{
3     1\foreach \j in {1, ..., 3}{.1}.
4     \foreach \j in {1, ..., 3}{.1}.1
5     }
6   }
7
```

A.3. Define new color sets: \newpixelartcolors

• Colors may be defined in the colors option

```
\definecolor{purple1}{RGB}{247, 176, 207}
1
    \definecolor{purple2}{RGB}{238, 33, 120}
    \definecolor{purple3}{RGB}{214, 45, 117}
    \definecolor{purple4}{RGB}{217, 25, 92}
    \definecolor{purple5}{RGB}{173, 29, 69}
    \pixelart[colors={
6
        1=purple1, 2=purple2, 3=purple3, 4=purple4, 5=purple5,
7
    }]{
      .54.43.
9
      4224215
10
      3445435
11
```

• Colors may be defined using \newpixelartcolors

```
\definecolor{purple1}{RGB}{247, 176, 207}
    \definecolor{purple2}{RGB}{238, 33, 120}
    \definecolor{purple3}{RGB}{214, 45, 117}
    \definecolor{purple4}{RGB}{217, 25, 92}
    \definecolor{purple5}{RGB}{173, 29, 69}
    \newpixelartcolors{purple}{
6
      1=purple1, 2=purple2, 3=purple3, 4=purple4, 5=purple5,
7
8
    \pixelart[colors=purple]{
      .54.43.
10
      4224215
11
      3445435
12
13
      .52424.
      ..434..
14
      ...2...
15
```

A.4. Predefined color sets

mono

A. Examples

```
\pixelart[colors=mono, tikz={
    red, scale=.3}]{
         ..01..23..
2
         .456789ab.
3
         {\tt cdefghijkl}
4
         mnopqrstuv
5
         wxyzABCDEF
6
         .GHIJKLMN.
7
         ..OPQRST..
8
         ...UVWX...
9
         ....YZ....
10
11
12
```

gray

```
pixelart[colors=gray, tikz={
    scale=.3}]{
    987654
    876543
    765432
    654321
    543210
    7    43210.
    8  }
```

BW

```
\pixelart[colors=BW, tikz={
    scale=.3}]{
        01010101
2
        10101010
3
        01010101
4
        10101010
5
        01010101
6
        10101010
7
        01010101
8
        10101010
9
      }
10
11
```

RGB

```
\pixelart[colors=RGB, tikz={
   scale=.1}]{
       2
       .RRR...GG..BBB..K..K.KWKKKWK
3
      .R..R.G..G.B..B.K.K..KWKKKWK
4
                                RGBK 💹
       .RRR..G....BBB..KK...KWKKKWK
       .R.R..G.GG.B..B.K.K..KWKWKWK
6
       .R..R.G..G.B..B.K..K.KWKWKWK
7
       .R..R..GG..BBB..K..K.KKWKWKK
       .....KKKKKKK
10
11
```

A.5. Option draft

```
1 \setpixelartdefault{tikz={scale=.3}}
2 \pixelart[colors=RGB]{
   ..RR..RR..
   .RRRRRRR.
   RRRRRRRRR
5
   RRRRRRRRRR
   RRRRRRRRR
   .RRRRRRR.
8
   ..RRRRRR..
   ...RRRR...
10
    ....RR....
11
12 }
13
14 \pixelart[colors=RGB, draft]{
    ..RR..RR..
    .RRRRRRR.
16
    RRRRRRRRR
17
   RRRRRRRRR
18
19
    RRRRRRRRR
   .RRRRRRR.
20
   ..RRRRRR..
21
    ...RRRR...
22
    ....RR....
23
24 }
```

A. Examples

A.6. Option style

```
1 \pixelart{
2    .1
3    1.
4 }
```

```
1 \pixelart[tikz={pixelart/.style={
    red}}] {
2    .1
3    1.
4 }
```

```
1 \tikzset{pixelart/.style={blue,
    draw=orange, very thick, rounded
    corners=5}}
2 \pixelart{
3    .1
4    1.
5 }
```

```
1 \pixelart[tikz={pixelart/.style={
    green}}] {
2    .1
3    1.
4 }
```

```
1 \tikzset{myfancystyle/.style={
    yellow}}
2 \pixelart[style=myfancystyle]{
3    .1
4    1.
5 }
```

A more complex example.

```
1 \tikzset{pixelart/.style={cyan,
    very thick, draw=black, rounded
    corners=5}}
2 \pixelart[squares={overlap=-.2},
    colors=mono, tikz={scale=.5},
    margin=.1]{
3    1..1..1
4    1..1...1
5    1111.1..1
6    1..1.1...
7    1..1.1..1
8 }
```

A.7. Option tikz

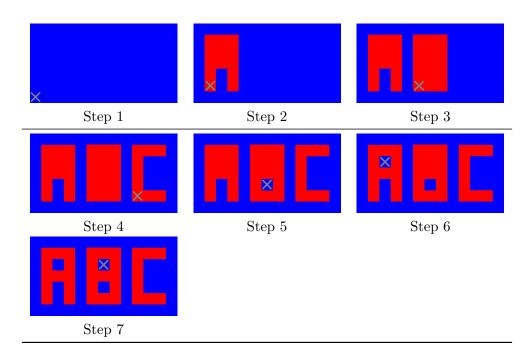
```
1 \pixelart[stack, colors={Y=yellow,
    K=black}, tikz={scale=.5, rounded
     corners=5}]{
    .. YYYY..
2
    .YYYYYY.
    YYKYYKYY
    YYYYYYY
5
    YKYYYYKY
6
    YYKKKKYY
8
    .YYYYYY.
9
    ..YYYY..
10 }
```

A.8. Drawing steps with the stack option

Here is how an image is built with the **stack** option: each of the following steps is a **\fill** command with carefully crafted shape. Those filled area are "stacked" on each other, to produce the expected result.

Line per line, the algorithm checks if the pixels have been drawn yet. In the following steps, the gray cross marks the first pixel that was not drawn yet, that triggered a new \fill command.

A. Examples



A.9. Option overlap

```
1 \setpixelartdefault{tikz={scale=.3}}
2 \newcommand{\three}{
    .111.
    11.11
    ...11
    ...11
    ..11.
    ...11
    ...11
   11.11
10
    .111.
11
13 \pixelart[squares={overlap=.1}]{
    \three
14
15 }
16 \pixelart[squares={overlap=0}]{
    \three
17
19 \pixelart[squares={overlap=-.1}]{
20
    \three
21 }
```

A.10. Command \tikzpixelart

A.11. Pictures used for the benchmark

The benchmark discussed in section 5.5 (page 10) uses three files with three big \pixelart commands. A small version of those commands is shown below.

mono Every single pixel of the same color.

```
\pixelart{
1
        KKKKKKKK
2
        KKKKKKKK
        KKKKKKKK
        KKKKKKKK
        KKKKKKKK
6
        KKKKKKKK
8
        KKKKKKKK
        KKKKKKKK
9
      }
10
11
```

concentric Cencentric squares, that is, several area with adjacent pixels of the same color.

A. Examples

```
\pixelart{
        GGGGGGG
2
        GKKKKKKG
3
        GKGGGGKG
4
        GKGRRGKG
5
        GKGRRGKG
6
        GKGGGGKG
7
        GKKKKKKG
8
        GGGGGGG
9
      }
10
11
```

checker A (kind of) checker board, where no two adjacent pixels have the same color.

```
\pixelart{
1
         RGRGRGRG
2
         BKBKBKBK
3
         RGRGRGRG
4
         {\tt BKBKBKBK}
6
         RGRGRGRG
         BKBKBKBK
7
         RGRGRGRG
8
         BKBKBKBK
9
10
       }
11
```

A.12. Default options

A.13. Option margin

In the first picture, you can see that part of the orange line has been clipped away. In the second one, with option margin correctly set, it is not clipped away.

```
1 \setpixelartdefault{squares}
2 \tikzset{pixelart/.style={
3   draw=orange,
4   rounded corners=5,
5   line width=5,
6 }}
7
8 \pixelart{11 11}
9
10 \pixelart[margin=.1]{11 11}
```

B. Change History

This is a raw copy of the CHANGELOG.md file that can be found in the git repository of pixelart.

- pixelart 1.0.0 (2022-11-16)
 - Full, backward incompatible, rewrite of pixelart, in Lua.
 - Keep version 0 of pixelart as pixelart0.
 - Louis Paternault spalax@gresille.org¹
- pixelart 0.3.0 (2022-11-16)
 - Renamed pixelart to pixelart0.
 - Mark pixelart0 as unmaintained.
 - Louis Paternault spalax@gresille.org²
- pixelart 0.2.0 (2018-02-25)
 - Add a draft package option.
 - Louis Paternault spalax@gresille.org³
- pixelart 0.1.2 (2018-01-13)
 - Fix bug: First line-break is now automatically ignored.
 - Minor documentation fixes and improvements.

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^{3.} mailto:spalax@gresille.org

B. Change History

- Louis Paternault spalax@gresille.org⁴
- pixelart 0.1.1 (2017-12-08)
 - Fix CTAN URLs.
 - Louis Paternault spalax@gresille.org 5
- pixelart 0.1.0 (2017-12-05)
 - First published version.
 - Louis Paternault spalax@gresille.org 6

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^{6.} mailto:spalax@gresille.org

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\mathbf{C}	\pixelartlogobw11
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