The luacolor package

Heiko Oberdiek
<oberdiek@uni-freiburg.de>

2007/12/12 v1.0

Abstract

Package luacolor implements color support based on LuaTeX's node attributes.

Contents

1 Documentation **2**
1.1 Introduction . . . 2
1.2 Usage . . . 2

2 Implementation **2**
2.1 Catcodes and identification . . . 2
2.2 Check for LuaTeX . . . 3
2.3 Check for disabled colors . . . 3
2.4 Find driver . . . 3
2.5 Attribute setting . . . 4
2.6 Whatsit insertion . . . 4
2.7 Lua module . . . 5
2.7.1 Driver detection . . . 5
2.7.2 Color strings . . . 6
2.7.3 Attribute register . . . 6
2.7.4 Whatsit insertion . . . 6

3 Test **7**
3.1 Catcode checks for loading . . . 7
3.2 Driver detection . . . 8
3.3 Short test for plain-TeX . . . 9

4 Installation **9**
4.1 Download . . . 9
4.2 Bundle installation . . . 9
4.3 Package installation . . . 10
4.4 Refresh file name databases . . . 10
4.5 Some details for the interested . . . 10

5 History **11**
[2007/12/12 v1.0] . . . 11

6 Index **11**

1 Documentation

1.1 Introduction

This package uses a LuaTeX's attribute register to to annotate nodes with color information. If a color is set, then the attribute register is set to this color and all nodes created in its scope (current group) are annotated with this attribute. Now the color property behaves much the same way as the font property.

1.2 Usage

Package color is loaded automatically by this package luacolor. If you need a special driver option or you prefer package xcolor, then load it before package luacolor, for example:

```
\usepackage[dvipdfmx]{xcolor}
```

The package luacolor is loaded without options:

```
\usepackage{luacolor}
```

It is able to detect PDF mode and DVI drivers are differentiated by its color specials. Therefore the package do need driver options.

Then it redefines the color setting commands to set attributes instead of whatsits for color.

At last the attribute annotations of the nodes in the output box must be analyzed to insert the necessary color whatsits. Currently LuaTeX lacks an appropriate callback function. Therefore package atbegshi is used to get control before a box is shipped out.

`\luacolorProcessBox` {⟨*box*⟩}

Macro `\luacolorProcessBox` processes the box ⟨*box*⟩ in the previously described manner. It is automatically called for pages, but not for XForm objects. Before passing a box to `\pdfxform`, call `\luacolorProcessBox` first.

2 Implementation

⟨∗package⟩

2.1 Catcodes and identification

```
\begingroup
  \catcode123 1 % {
  \catcode125 2 % }
  \def\x{\endgroup
    \expandafter\edef\csname LuaCol@AtEnd\endcsname{%
      \catcode35 \the\catcode35\relax
      \catcode64 \the\catcode64\relax
      \catcode123 \the\catcode123\relax
      \catcode125 \the\catcode125\relax
    }%
  }%
\x
\catcode35 6 % #
\catcode64 11 % @
\catcode123 1 % {
\catcode125 2 % }
\def\TMP@EnsureCode#1#2{%
  \edef\LuaCol@AtEnd{%
    \LuaCol@AtEnd
```

```
    \catcode#1 \the\catcode#1\relax
  }%
  \catcode#1 #2\relax
}
\TMP@EnsureCode{34}{12}% "
\TMP@EnsureCode{39}{12}% '
\TMP@EnsureCode{40}{12}% (
\TMP@EnsureCode{41}{12}% )
\TMP@EnsureCode{42}{12}% *
\TMP@EnsureCode{43}{12}% +
\TMP@EnsureCode{44}{12}% ,
\TMP@EnsureCode{45}{12}% -
\TMP@EnsureCode{46}{12}% .
\TMP@EnsureCode{47}{12}% /
\TMP@EnsureCode{58}{12}% :
\TMP@EnsureCode{60}{12}% <
\TMP@EnsureCode{61}{12}% =
\TMP@EnsureCode{62}{12}% >
\TMP@EnsureCode{95}{12}% _ (other!)
\TMP@EnsureCode{96}{12}% `
\edef\LuaCol@AtEnd{%
  \LuaCol@AtEnd
  \noexpand\endinput
}
```

Package identification.

```
\NeedsTeXFormat{LaTeX2e}
\ProvidesPackage{luacolor}%
  [2007/12/12 v1.0 Coloring based on LuaTeX's node attributes (HO)]
```

2.2 Check for LuaTeX

Without LuaTeX there is no point in using this package.

```
\RequirePackage{infwarerr}[2007/09/09]%
\RequirePackage{ifluatex}[2007/12/12]%
\RequirePackage{color}

\ifluatex
  \RequirePackage{luatex}[2007/12/12]%
\else
  \@PackageError{luacolor}{%
    This package may only be run using LuaTeX%
  }\@ehc
  \expandafter\LuaCol@AtEnd
\fi
```

2.3 Check for disabled colors

```
\ifcolors@
\else
  \@PackageWarningNoLine{luacolor}{%
    Colors are disabled by option `monochrome'%
  }%
  \expandafter\LuaCol@AtEnd
\fi
```

2.4 Find driver

```
\directlua0{%
  require("oberdiek.luacolor")%
}
\RequirePackage{ifpdf}[2007/09/09]
\ifpdf
\else
  \begingroup
```

```
    \def\current@color{}%
    \def\reset@color{}%
    \setbox\z@=\hbox{%
      \begingroup
        \set@color
      \endgroup
    }%
    \edef\reserved@a{%
      \directlua0{%
        oberdiek.luacolor.dvidetect()%
      }%
    }%
    \ifx\reserved@a\@empty
      \@PackageError{luacolor}{%
        DVI driver detection failed because of\MessageBreak
        unrecognized color \string\special
      }\@ehc
      \endgroup
      \expandafter\expandafter\expandafter\LuaCol@AtEnd
    \else
      \@PackageInfoNoLine{luacolor}{%
        Type of color \string\special: \reserved@a
      }%
    \fi
  \endgroup
\fi
```

2.5 Attribute setting

\LuaCol@Attribute

```
\newattribute\LuaCol@Attribute
\directlua0{%
  oberdiek.luacolor.setattribute(\number\allocationnumber)%
}
```

\set@color

```
\protected\def\set@color{%
  \setattribute\LuaCol@Attribute{%
    \directlua0{%
      oberdiek.luacolor.get("\luaescapestring{\current@color}")%
    }%
  }%
}
```

\reset@color

```
\def\reset@color{}
```

2.6 Whatsit insertion

\luacolorProcessBox

```
\def\luacolorProcessBox#1{%
  \directlua0{%
    oberdiek.luacolor.process(\number#1)%
  }%
}
\RequirePackage{atbegshi}[2007/09/09]
\AtBeginShipout{%
  \luacolorProcessBox\AtBeginShipoutBox
}
```

Set default color.

```
\set@color
```

```
\LuaCol@AtEnd
```
⟨/package⟩

2.7 Lua module

⟨∗lua⟩

Box zero contains a `\hbox` with the color `\special`. That is analyzed to get the prefix for the color setting `\special`.

```
module("oberdiek.luacolor", package.seeall)
```

2.7.1 Driver detection

```
local ifpdf
if tonumber(tex.pdfoutput) > 0 then
  ifpdf = true
else
  ifpdf = false
end
local prefix
local prefixes = {
  dvips   = "color ",
  dvipdfm = "pdf:sc ",
  truetex = "textcolor:",
  pctexps = "ps::",
}
local patterns = {
  ["^color "]            = "dvips",
  ["^pdf: *begincolor "] = "dvipdfm",
  ["^pdf: *bcolor "]     = "dvipdfm",
  ["^pdf: *bc "]         = "dvipdfm",
  ["^pdf: *setcolor "]   = "dvipdfm",
  ["^pdf: *scolor "]     = "dvipdfm",
  ["^pdf: *sc "]         = "dvipdfm",
  ["^textcolor:"]        = "truetex",
  ["^ps::"]              = "pctexps",
}
local function info(msg, term)
  local target = "log"
  if term then
    target = "term and log"
  end
  texio.write_nl(target, "Package luacolor info: " .. msg .. ".")
  texio.write_nl(target, "")
end
function dvidetect()
  local v = tex.box[0]
  assert(v.id == node.id("hlist"))
  for v in node.traverse_id(node.id("whatsit"), v.list) do
    if v and v.subtype == 3 then -- special
      local data = v.data
      for pattern, driver in pairs(patterns) do
        if string.find(data, pattern) then
          prefix = prefixes[driver]
          tex.write(driver)
          return
        end
      end
      info("\\special{" .. data .. "}", true)
      return
    end
  end
  info("Missing \\special", true)
```

```
end
```

2.7.2 Color strings

```
local map = {
  n = 0,
}
function get(color)
  local n = map[color]
  if not n then
    n = map.n + 1
    map.n = n
    map[n] = color
    map[color] = n
  end
  tex.write("" .. n)
end
```

2.7.3 Attribute register

```
local attribute
function setattribute(attr)
  attribute = attr
end
```

2.7.4 Whatsit insertion

```
function process(box)
  local color = ""
  local list = tex.getbox(box)
  traverse(list, color)
end
```

```
local LIST = 1
local COLOR = 2
local type = {
  [node.id("hlist")] = LIST,
  [node.id("vlist")] = LIST,
  [node.id("rule")]  = COLOR,
  [node.id("glyph")] = COLOR,
  [node.id("disc")]  = COLOR,
}
local subtype = {
  [3] = COLOR, -- special
  [8] = COLOR, -- pdf_literal
}
local mode = 2 -- luatex.pdfliteral.direct
local WHATSIT = node.id("whatsit")
local SPECIAL = 3
local PDFLITERAL = 8
```

```
function traverse(list, color)
  if not list then
    return color
  end
  if type[list.id] ~= LIST then
    texio.write_nl("!!! Error: Wrong list type: " .. node.type(list.id))
    return color
  end
⟨debug⟩texio.write_nl("traverse: " .. node.type(list.id))
  local head = list.list
  for n in node.traverse(head) do
⟨debug⟩texio.write_nl("  node: " .. node.type(n.id))
    local type = type[n.id]
    if type == LIST then
      color = traverse(n, color)
    elseif type == COLOR
```

```
           or (type == WHATSIT
               and subtype[n.subtype]) then
      local v = node.has_attribute(n, attribute)
      if v then
        local newColor = map[v]
        if newColor ~= color then
          color = newColor
          local newNode
          if ifpdf then
            newNode = node.new(WHATSIT, PDFLITERAL)
            newNode.mode = mode
            newNode.data = color
          else
            newNode = node.new(WHATSIT, SPECIAL)
            newNode.data = prefix .. color
          end
          if head == n then
            newNode.next = head
            local old_prev = head.prev
            head.prev = newNode
            head = newNode
            head.prev = old_prev
          else
            head = node.insert_before(head, n, newNode)
          end
        end
      end
    end
  end
  list.list = head
  return color
end
```

⟨/lua⟩

3 Test

```
⟨*test1⟩
\documentclass{article}
\usepackage{color}
⟨/test1⟩
```

3.1 Catcode checks for loading

```
⟨*test1⟩
\catcode`\{=1 %
\catcode`\}=2 %
\catcode`\#=6 %
\catcode`\@=11 %
\expandafter\ifx\csname count@\endcsname\relax
  \countdef\count@=255 %
\fi
\expandafter\ifx\csname @gobble\endcsname\relax
  \long\def\@gobble#1{}%
\fi
\expandafter\ifx\csname @firstofone\endcsname\relax
  \long\def\@firstofone#1{#1}%
\fi
\expandafter\ifx\csname loop\endcsname\relax
  \expandafter\@firstofone
\else
  \expandafter\@gobble
\fi
{%
```

```
  \def\loop#1\repeat{%
    \def\body{#1}%
    \iterate
  }%
  \def\iterate{%
    \body
      \let\next\iterate
    \else
      \let\next\relax
    \fi
    \next
  }%
  \let\repeat=\fi
}%
\def\RestoreCatcodes{}
\count@=0 %
\loop
  \edef\RestoreCatcodes{%
    \RestoreCatcodes
    \catcode\the\count@=\the\catcode\count@\relax
  }%
\ifnum\count@<255 %
  \advance\count@ 1 %
\repeat

\def\RangeCatcodeInvalid#1#2{%
  \count@=#1\relax
  \loop
    \catcode\count@=15 %
  \ifnum\count@<#2\relax
    \advance\count@ 1 %
  \repeat
}
\expandafter\ifx\csname LoadCommand\endcsname\relax
  \def\LoadCommand{\input luacolor.sty\relax}%
\fi
\def\Test{%
  \RangeCatcodeInvalid{0}{47}%
  \RangeCatcodeInvalid{58}{64}%
  \RangeCatcodeInvalid{91}{96}%
  \RangeCatcodeInvalid{123}{255}%
  \catcode`\@=12 %
  \catcode`\\=0 %
  \catcode`\{=1 %
  \catcode`\}=2 %
  \catcode`\#=6 %
  \catcode`\[=12 %
  \catcode`\]=12 %
  \catcode`\%=14 %
  \catcode`\ =10 %
  \catcode13=5 %
  \LoadCommand
  \RestoreCatcodes
}
\Test
\csname @@end\endcsname
\end
```

⟨/test1⟩

3.2 Driver detection

```
⟨*test2⟩
\NeedsTeXFormat{LaTeX2e}
```

```
\ifcsname driver\endcsname
  \expandafter\PassOptionsToPackage\expandafter{\driver}{color}%
  \pdfoutput=0 %
\fi
\documentclass{minimal}
\usepackage{luacolor}[2007/12/12]
\csname @@end\endcsname
\end
```
⟨/test2⟩

⟨*test3⟩
```
\NeedsTeXFormat{LaTeX2e}
```

```
\documentclass{minimal}
\usepackage{luacolor}[2007/12/12]
\usepackage{qstest}
\IncludeTests{*}
\LogTests{log}{*}{*}
\makeatletter
```

```
\@@end
```
⟨/test3⟩

3.3 Short test for plain-TEX

⟨*test4⟩
```
\input luacolor.sty\relax
\newluastate\TestLuaState
\newattribute\TestAttr
\setattribute\TestAttr{10}
\unsetattribute\TestAttr
\newcatcodetable\TestCTa
\begingroup
  \SetCatcodeRange{`A}{`Z}{12}%
\endgroup
\BeginCatcodeRegime\__CT__LaTeX
\EndCatcodeRegime
\end
```
⟨/test4⟩

4 Installation

4.1 Download

Package. This package is available on CTAN[1]:

CTAN:macros/latex/contrib/oberdiek/luacolor.dtx The source file.

CTAN:macros/latex/contrib/oberdiek/luacolor.pdf Documentation.

Bundle. All the packages of the bundle 'oberdiek' are also available in a TDS compliant ZIP archive. There the packages are already unpacked and the documentation files are generated. The files and directories obey the TDS standard.

CTAN:install/macros/latex/contrib/oberdiek.tds.zip

TDS refers to the standard "A Directory Structure for TEX Files" (CTAN:tds/tds.pdf). Directories with `texmf` in their name are usually organized this way.

4.2 Bundle installation

Unpacking. Unpack the `oberdiek.tds.zip` in the TDS tree (also known as `texmf` tree) of your choice. Example (linux):

```
unzip oberdiek.tds.zip -d ~/texmf
```

[1] ftp://ftp.ctan.org/tex-archive/

Script installation. Check the directory `TDS:scripts/oberdiek/` for scripts that need further installation steps. Package attachfile2 comes with the Perl script `pdfatfi.pl` that should be installed in such a way that it can be called as `pdfatfi`. Example (linux):

```
chmod +x scripts/oberdiek/pdfatfi.pl
cp scripts/oberdiek/pdfatfi.pl /usr/local/bin/
```

4.3 Package installation

Unpacking. The `.dtx` file is a self-extracting docstrip archive. The files are extracted by running the `.dtx` through plain-TEX:

```
tex luacolor.dtx
```

TDS. Now the different files must be moved into the different directories in your installation TDS tree (also known as `texmf` tree):

```
luacolor.sty            → tex/latex/oberdiek/luacolor.sty
oberdiek.luacolor.lua   → scripts/oberdiek/oberdiek.luacolor.lua
luacolor.lua            → scripts/oberdiek/luacolor.lua
luacolor.pdf            → doc/latex/oberdiek/luacolor.pdf
test/luacolor-test1.tex → doc/latex/oberdiek/test/luacolor-test1.tex
test/luacolor-test2.tex → doc/latex/oberdiek/test/luacolor-test2.tex
test/luacolor-test3.tex → doc/latex/oberdiek/test/luacolor-test3.tex
luacolor.dtx            → source/latex/oberdiek/luacolor.dtx
```

If you have a `docstrip.cfg` that configures and enables docstrip's TDS installing feature, then some files can already be in the right place, see the documentation of docstrip.

4.4 Refresh file name databases

If your TEX distribution (teTEX, mikTEX, ...) relies on file name databases, you must refresh these. For example, teTEX users run `texhash` or `mktexlsr`.

4.5 Some details for the interested

Attached source. The PDF documentation on CTAN also includes the `.dtx` source file. It can be extracted by AcrobatReader 6 or higher. Another option is pdftk, e.g. unpack the file into the current directory:

```
pdftk luacolor.pdf unpack_files output .
```

Unpacking with LATEX. The `.dtx` chooses its action depending on the format:

plain-TEX: Run docstrip and extract the files.

LATEX: Generate the documentation.

If you insist on using LATEX for docstrip (really, docstrip does not need LATEX), then inform the autodetect routine about your intention:

```
latex \let\install=y\input{luacolor.dtx}
```

Do not forget to quote the argument according to the demands of your shell.

Generating the documentation. You can use both the `.dtx` or the `.drv` to generate the documentation. The process can be configured by the configuration file `ltxdoc.cfg`. For instance, put this line into this file, if you want to have A4 as paper format:

```
\PassOptionsToClass{a4paper}{article}
```

An example follows how to generate the documentation with pdfLaTeX:

```
pdflatex luacolor.dtx
makeindex -s gind.ist luacolor.idx
pdflatex luacolor.dtx
makeindex -s gind.ist luacolor.idx
pdflatex luacolor.dtx
```

5 History

[2007/12/12 v1.0]

- First public version.

6 Index

Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; numbers in roman refer to the code lines where the entry is used.

Symbols

\# 271, 333
\% 336
\@ 272, 329
\@@end 365
\@PackageError 54, 86
\@PackageInfoNoLine 93
\@PackageWarningNoLine 61
\@ehc 56, 89
\@empty 85
\@firstofone 280, 283
\@gobble 277, 285
\[. 334
\\ 170, 174, 330
\{ 269, 331
\} 270, 332
\] 335
_ 377
\␣ 337

A

\advance 310, 318
\allocationnumber 101
\AtBeginShipout 117
\AtBeginShipoutBox 118

B

\BeginCatcodeRegime 377
\body 289, 293

C

\catcode 3, 4, 7, 8, 9, 10, 14, 15, 16, 17, 21, 23, 269, 270, 271, 272, 307, 316, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338
\count@ 274, 303, 307, 309, 310, 314, 316, 317, 318
\countdef 274
\csname 6, 273, 276, 279, 282, 321, 343, 354
\current@color 73, 106

D

\directlua 66, 81, 100, 105, 112
\documentclass 265, 352, 359
\driver 349

E

\end 344, 355, 379
\EndCatcodeRegime 378
\endcsname 6, 273, 276, 279, 282, 321, 343, 348, 354
\endinput 43

H

\hbox 75

I

\ifcolors@ 59
\ifcsname 348
\ifluatex 51
\ifnum 309, 317
\ifpdf 70
\ifx 85, 273, 276, 279, 282, 321
\IncludeTests 362
\input 322, 368
\iterate 290, 292, 294

L

\LoadCommand 322, 339
\LogTests 363
\loop 288, 304, 315
\LuaCol@AtEnd 19, 20, 41, 42, 57, 64, 91, 121
\LuaCol@Attribute 99, 104
\luacolorProcessBox *2*, 111, 118
\luaescapestring 106

M

\makeatletter 364
\MessageBreak 87

N

\NeedsTeXFormat 45, 347, 358
\newattribute 99, 370
\newcatcodetable 373
\newluastate 369
\next 294, 296, 298
\number 101, 113

P

\PassOptionsToPackage 349
\pdfoutput 350
\protected 103
\ProvidesPackage 46

R

\RangeCatcodeInvalid 313, 325, 326, 327, 328
\repeat 288, 300, 311, 319
\RequirePackage 48, 49, 50, 52, 69, 116
\reserved@a 80, 85, 94
\reset@color 74, 110
\RestoreCatcodes . . 302, 305, 306, 340

S

\set@color 77, 103, 120
\setattribute 104, 371
\setbox 75
\SetCatcodeRange 375
\special 88, 94

T

\Test 324, 342
\TestAttr 370, 371, 372
\TestCTa 373
\TestLuaState 369
\the 7, 8, 9, 10, 21, 307
\TMP@EnsureCode 18, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

U

\unsetattribute 372
\usepackage 266, 353, 360, 361

X

\x 5, 13

Z

\z@ 75