» The Monty Pythons, were they TEX users,
could have written the chickenize macro.«

Paul Isambert

chickenize

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November 20, 2011

This is the package `chickenize`. It allows manipulations of any LuaTEX document[1] exploiting the possibilities offered by the callbacks that influence line breaking. Most of this package's content is just for fun and educational use, but there are also some functions that can be really useful.

The following table informs you shortly about some of your possibilities and provides links to the Lua functions. The TEX interface is presented below.

The documentation of this package is far from being well-readable, consistent or even complete. This is caused either by lack of time or priority. If you miss anything that should be documented or if you have suggestions on how to increase the readability of the descriptions, please let me know.

maybe usefull things	
colorstretch	shows grey boxes that depict the badness and font expansion of each line
letterspaceadjust	uses a small amount of letterspacing to improve the greyness, especially for narrow lines

less usefull things	
leetspeak	translates the (latin-based) input into 1337 5p34k
randomuclc	changes randomly between uppercase and lowercase
rainbowcolor	changes the color of letters slowly according to a rainbow
randomcolor	prints every letter in a random color
tabularasa	removes every glyph from the output and leaves an empty document
uppercasecolor	makes every uppercase letter colored

complete nonsense

[1]The code is based on pure LuaTEX features, so don't even try to use it with any other TEX flavour. The package is tested under LuaLATEX, and should be working fine with plainLuaTEX. If you tried it with ConTEXt, please share your experience!

chickenize	replaces every word with “chicken”
hammertime	U can't touch this!
matrixize	replaces every glyph by its ASCII value in binary code
randomfonts	changes the font randomly between every letter
randomchars	randomizes the (letter of the) whole input

If you have any suggestions or comments, just drop me a mail, I’ll be happy to get any response!

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Part I
User Documentation

1 How It Works

We make use of LuaTEXs callbacks, especially the `pre_linebreak_filter` and the `post_linebreak_filter`. Hooking a function into these, we can nearly arbitrarily change the contents of the document. If the changes should be on the input-side (replacing with `chicken`), one can use the `pre_linebreak_filter`. Hower, changes like inserting color are best made after the linebreak is finalized, so `post_linebreak_filter` is used for such things.

All functions traverse the node list of a paragraph and manipulate the nodes' properties (like `.font` or `.char`) or insert nodes (like color push/pop nodes) and return this changed node list.

2 Commands – How You Can Use It

There are several ways to make use of this package – you can either stay on the TEX side or use the Lua functions directly. In fact, the TEX macros are simple wrappers around the functions.

2.1 TEX Commands – Document Wide

You have a number of commands at your hand, each of which does some manipulation of the input or output. In fact, the code is easy and straightforward, but be careful, especially when combining things. Apply features step by step so your brain won't be damaged …

The effect of the commands can be influenced, not with arguments, but only via the `\chickenizesetup` described below.

`\chickenize` Replaces every word of the input with the word "chicken". Maybe sometime the replaced word can be changed, but up to now, it's only chicken. To be a bit less static, about every 10th chicken is uppercase. However, the beginning of a sentence is not recognized automatically.[2]

`\hammertime` STOP! —— Hammertime!

`\uppercasecolor` Makes every uppercase character in the input colored. At the moment, the color is randomized over the full rgb scale, but that will be adjustable once options are well implemented.

[2] If you have a nice implementation idea, I'd love to include this!

`\randomuclc` Changes every character of the input into its uppercase or lowercase variant. Well, guess what the "random" means …

`\randomfonts` Changes the font randomly for every character. If no parameters are given, all fonts that have been loaded are used, especially including math fonts.

`\randomcolor` Does what it's name says.

`\rainbowcolor` Instead of random colors, this command causes the text color to change slowly according to the colors of a rainbow. Do not mix this with `randomcolor`, as that doesn't make any sense.

`\pancakenize` This is a dummy so far, as I have no idea what it should do. If you have suggestions, please tell me.

`\tabularasa` Takes every glyph out of the document and replaces it by empty space of the same width. That could be useful if you want to hide some part of a text or similar. The `\text`-version is most likely more useful.

`\leetspeak` Translates the input into 1337 speak. If you don't understand that, lern it, n00b.

`\nyanize` A synonym for `rainbowcolor`.

`\matrixize` Replaces every glyph by a binary sequence representating its ASCII value.

`\colorstretch` Inspired by Paul Isambert's code, this command prints boxes instead of lines. The greyness of the first (left-hand) box corresponds to the badness of the line, i. e. it is a measure for how much the space between words has been extended to get proper paragraph justification. The second box on the right-hand side shows the amount of stretching/shrinking when font expansion is used. Together the box greyness give you information about how well the overall greyness of the typeset page is.

2.2 How to Deactivate It

Every command has a `\un`-version that deactivetes it's functionality. So once you used `\chickenize`, it will chickenize the whole document up to `\unchickenize`. However, the paragraph in which `\unchickenize` appears, will *not* be chickenized. The same is true for all other manipulations. Take care that you don't `\un`-anything bevor activating it, as this will result in an error.[3]

If you want to manipulate only a part of a paragraph, you have use the `\text`-version of the function, see below. However, feel free to set and unset every function at will at any place in your document.

[3]Which is so far not catchable due to missing functionality in luatexbase.

2.3 `\text`-Versions

The functions of this package might be much more useful if applied only to a short sequence of words or single words instead of the whole document or paragraph. Therefore, most of the above-mentioned commands have[4] a `\text`-version that takes an argument. `\textrandomcolor{foo}` results in a colored `foo` while the rest of the document keeps its color. However, to achieve this effect, still the whole node list has to be traversed, so it may slow down your document, even if you use `\textrandomcolor` only once. Fortunately, the effect is very small and mostly negligible.[5]

Please don't fool around by mixing a `\text`-version with the non-`\text`-version. If you feel like and are not please with the result, it is up to *you* to provide a stable and working solution.

2.4 Lua functions

As all features are implemented on the Lua side, you can use these functions on their own. If you do so, please consult the corresponding subsections in the implementation part, because there are some variables that can be adapted to your need.

You can use the following code inside a `\directlua` statement or in a `luacode` environment (or the corresponding thing in your format):

```
luatexbase.add_to_callback("pre_linebreak_filter",chickenize,"chickenize")
```

Replace `pre` by `post` to register into the post linebreak filter. The second argument gives the function name; find a list of available functions below. You can give a label as you like in the third argument, and the last argument gives the order in which the functions in the callback are used. If you have no fancy stuff going on, you can safely use `1`.

3 Options – How to Adjust It

There are several ways to change the behaviour of `chickenize` and its macros. Most of the options are Lua variables and can be set using `\chickenizesetup`. But be *careful!* The argument of `\chickenizesetup` is parsed directly to Lua, therefore you are *not* using a comma-separated key-value list, but uncorrelated Lua commands. The argument must have the syntax `{randomfontslower = 1 randomfontsupper = 0}` instead of `{randomfontslower = 1, randomfontsupper = 0}`. Alright?

However, `\chickenizesetup` is a macro on the TeX side meaning that you can use *only* `%` as comment string. If you use `--`, all of the argument will be ignored as TeX does not pass an eol to `\directlua`. If you don't understand that, just ignore it and go on as usual.

[4]If they don't have, I did miss that, sorry. Please inform me about such cases.

[5]On a 500 pages text-only LaTeX document the dilation is on the order of 10% with `textrandomcolor`, but other manipulations can take much more time. However, you are not supposed to make such long documents with `chickenize`!

The following list tries to keep kind of track to the options and variables. There is no guarantee for this list, and if you find something that is missing or doesn't work as described here, please inform me!

3.1 chickenize

3.2

`randomfontslower`, `randomfontsupper` = `<int>` These two integer variables determine the span of fonts used for the font randomization. Just play with them a bit to find out what they are doing.

`chickenstring` = `<table>` The string that is printed when using `\chickenize`. In fact, `chickenstring` is a table which allows for some more random action. To specify the default string, say `chickenstring[1] = 'chicken'`. For more than one animal, just step the index: `chickenstring[2] = 'rabbit'`. All existing table entries will be used randomly. Remember that we are dealing with Lua strings here, so use `' '` to mark them. (`" "` can cause problems with `babel`.)

`chickenizefraction` = `<float>` `1` Gives the fraction of words that get replaced by the `chickenstring`. The default means that every word is substituted. However, with a value of, say, `0.0001`, only one word in ten thousand will be `chickenstring`. `chickenizefraction` must be specified *after* `\begin{document}`. No idea, why …

`colorstretchnumbers` = `<true>` If true, the amount of stretching or shrinking of each line is printed into the margin as a green, red or black number.

`leettable` = `<table>` From this table, the substitution for 1337 is taken. If you want to add or change an entry, you have to provide the unicode numbers of the characters, e. g. `leettable[101] = 50` replaces every `e` (`101`) with the number `3` (`50`).

`uclcratio` = `<float>` `0.5` Gives the fraction of uppercases to lowercases in the `\randomuclc` mode. A higher number (up to 1) gives more uppercase letters. Guess what a lower number does.

`randomcolor_grey` = `<bool>` `false` For a printer-friendly version, this offers a grey scale instead of an rgb value for `\randomcolor`.

`rainbow_step` = `<float>` `0.005` This indicates the relative change of color using the rainbow functionality. A value of `1` changes the color in one step from red to yellow, while a value of `0.005` takes 200 lettrs for this change. Useful values are below `0.05`, but it depends on the amount of text. The longer the text and the lower the `step`, the nicer your rainbow will be.

`Rgb_lower`, `rGb_upper` = `<int>` To specify the color space that is used for `\randomcolor`, you can specify six values, the upper and lower value for each color. The uppercase letter in the variable denotes the color, so `rGb_upper` gives the upper value for green etc. Possible values are between `1` and `254`. If you enter anything outside this, your pdf will become invalid and break. For grey scale, use `grey_lower` and `grey_upper`, with values between `0` (black) and `1000` (white), included. Default is `0` to `900` to prevent white letters.

`keeptext` = `<bool>` `false` This is for the `\colorstretch` command. If set to `true`, the text of your document will be kept. This way, it is easier to identify bad lines and the reason for the badness.

`colorexpansion` = `<bool>` `true` If `true`, two bars are shown of which the second one denotes the font expansion. Only usefull if font expansion is used. (You *do* use font expansion, do you?)

Part II
Implementation

4 TeX file

This file is more-or-less just a dummy file to offer a nice interface for the functions. Basically, every macro registers the function with the same name in the corresponding callback. The un-macros remove the functions. If it makes sense, there are `text`-variants that activate the function only in a certain area of the text, using LuaTeX's attributes.

For (un)registering, we use the `luatexbase` package. Then, the `.lua` file is loaded which does the actual work. Finally, the TeX macros are defined as simple `\directlua` calls.

```
\input{luatexbase.sty}
\directlua{dofile("chickenize.lua")}

\def\chickenize{
  \directlua{luatexbase.add_to_callback("pre_linebreak_filter",chickenize,"chickenize")
    luatexbase.add_to_callback("start_page_number",
    function() texio.write("["..status.total_pages) end ,"cstartpage")
    luatexbase.add_to_callback("stop_page_number",
    function() texio.write(" chickens]") end,"cstoppage")
%
    luatexbase.add_to_callback("stop_run",nicetext,"a nice text")
  }
}
\def\unchickenize{
  \directlua{luatexbase.remove_from_callback("pre_linebreak_filter","chickenize")
    luatexbase.remove_from_callback("start_page_number","cstarttpage")
    luatexbase.remove_from_callback("stop_page_number","cstoppage")}}

\def\coffeestainize{  %% to be implemented.
  \directlua{}}
\def\uncoffeestainize{
  \directlua{}}

\def\colorstretch{
  \directlua{luatexbase.add_to_callback("post_linebreak_filter",colorstretch,"stretch_expansion")
\def\uncolorstretch{
  \directlua{luatexbase.remove_from_callback("post_linebreak_filter","stretch_expansion")}}

\def\dosomethingfunny{
    %% should execute one of the "funny" commands, but randomly. So every compilation is complete
  }

\def\hammertime{
  \global\let\n\relax
  \directlua{hammerfirst = true
             luatexbase.add_to_callback("pre_linebreak_filter",hammertime,"hammertime")}}
\def\unhammertime{
  \directlua{luatexbase.remove_from_callback("post_linebreak_filter","hammertime")}}

\def\itsame{
  \directlua{drawmario}}

\def\leetspeak{
  \directlua{luatexbase.add_to_callback("post_linebreak_filter",leet,"1337")}}
\def\unleetspeak{
  \directlua{luatexbase.remove_from_callback("post_linebreak_filter","1337")}}

\def\letterspaceadjust{
  \directlua{luatexbase.add_to_callback("pre_linebreak_filter",letterspaceadjust,"letterspaceadju
\def\unletterspacedjust{
  \directlua{luatexbase.remove_from_callback("pre_linebreak_filter","letterspaceadjust")}}

\let\stealsheep\letterspaceadjust     %% synonym in honor of Paul
\let\unstealsheep\unletterspaceadjust

\def\matrixize{
  \directlua{luatexbase.add_to_callback("pre_linebreak_filter",matrixize,"matrixize")}}
\def\unmatrixize{
  \directlua{lutaexbase.remove_from_callback("pre_linebreak_filter",matrixize)}}

```

```
\def\milkcow{     %% to be implemented
  \directlua{}}
\def\unmilkcow{
  \directlua{}}

\def\pancakenize{        %% to be implemented
  \directlua{}}
\def\unpancakenize{
  \directlua{}}

\def\rainbowcolor{
  \directlua{luatexbase.add_to_callback("post_linebreak_filter",randomcolor,"rainbowcolor")
             rainbowcolor = true}}
\def\unrainbowcolor{
  \directlua{luatexbase.remove_from_callback("post_linebreak_filter","rainbowcolor")
             rainbowcolor = false}}
  \let\nyanize\rainbowcolor
  \let\unnyanize\unrainbowcolor

\def\randomcolor{
  \directlua{luatexbase.add_to_callback("post_linebreak_filter",randomcolor,"randomcolor")}}
\def\unrandomcolor{
  \directlua{luatexbase.remove_from_callback("post_linebreak_filter","randomcolor")}}

\def\randomfonts{
  \directlua{luatexbase.add_to_callback("post_linebreak_filter",randomfonts,"randomfonts")}}
\def\unrandomfonts{
  \directlua{luatexbase.remove_from_callback("post_linebreak_filter","randomfonts")}}

\def\randomuclc{
  \directlua{luatexbase.add_to_callback("pre_linebreak_filter",randomuclc,"randomuclc")}}
\def\unrandomuclc{
  \directlua{luatexbase.remove_from_callback("pre_linebreak_filter","randomuclc")}}

\def\spankmonkey{    %% to be implemented
  \directlua{}}
\def\unspankmonkey{
  \directlua{}}

\def\tabularasa{
  \directlua{luatexbase.add_to_callback("post_linebreak_filter",tabularasa,"tabularasa")}}
\def\untabularasa{
  \directlua{luatexbase.remove_from_callback("post_linebreak_filter","tabularasa")}}

\def\uppercasecolor{
  \directlua{luatexbase.add_to_callback("post_linebreak_filter",uppercasecolor,"uppercasecolor")}
```

```
\def\unuppercasecolor{
  \directlua{luatexbase.remove_from_callback("post_linebreak_filter","uppercasecolor")}}
```

Now the setup for the `\text`-versions. We utilize LuaTEXs attributes to mark all nodes that should be manipulated. The macros should be `\long` to allow arbitrary input.

```
\newluatexattribute\leetattr
\newluatexattribute\randcolorattr
\newluatexattribute\randfontsattr
\newluatexattribute\randuclcattr
\newluatexattribute\tabularasaattr

\long\def\textleetspeak#1%
  {\setluatexattribute\leetattr{42}#1\unsetluatexattribute\leetattr}
\long\def\textrandomcolor#1%
  {\setluatexattribute\randcolorattr{42}#1\unsetluatexattribute\randcolorattr}
\long\def\textrandomfonts#1%
  {\setluatexattribute\randfontsattr{42}#1\unsetluatexattribute\randfontsattr}
\long\def\textrandomfonts#1%
  {\setluatexattribute\randfontsattr{42}#1\unsetluatexattribute\randfontsattr}
\long\def\textrandomuclc#1%
  {\setluatexattribute\randuclcattr{42}#1\unsetluatexattribute\randuclcattr}
\long\def\texttabularasa#1%
  {\setluatexattribute\tabularasaattr{42}#1\unsetluatexattribute\tabularasaattr}
```

Finally, a macro to control the setup. So far, it's only a wrapper that allows TEX-style comments to make the user feel more at home.

```
\def\chickenizesetup#1{\directlua{#1}}
```

The following is the very first try of implementing a small drawing language in Lua. It draws a beautiful chicken.

```
\long\def\luadraw#1#2{%
  \vbox to #1bp{%
    \vfil
    \luatexlatelua{pdf_print("q") #2 pdf_print("Q")}%
  }%
}
\long\def\drawchicken{
\luadraw{90}{
kopf = {200,50} % Kopfmitte
kopf_rad = 20

d = {215,35} % Halsansatz
e = {230,10} %

korper = {260,-10}
korper_rad = 40

bein11 = {260,-50}
bein12 = {250,-70}
bein13 = {235,-70}

bein21 = {270,-50}
bein22 = {260,-75}
bein23 = {245,-75}

schnabel_oben = {185,55}
schnabel_vorne = {165,45}
schnabel_unten = {185,35}

flugel_vorne = {260,-10}
flugel_unten = {280,-40}
flugel_hinten = {275,-15}

sloppycircle(kopf,kopf_rad)
sloppyline(d,e)
sloppycircle(korper,korper_rad)
sloppyline(bein11,bein12) sloppyline(bein12,bein13)
sloppyline(bein21,bein22) sloppyline(bein22,bein23)
sloppyline(schnabel_vorne,schnabel_oben) sloppyline(schnabel_vorne,schnabel_unten)
sloppyline(flugel_vorne,flugel_unten) sloppyline(flugel_hinten,flugel_unten)

}
}
```

5 LaTeX package

I have decided to keep the LaTeX-part of this package as small as possible. So far, it does … nothing usefull, but it provides a `chickenize.sty` that loads `chickenize.tex` so the user can still say `\usepackage{chickenize}`. This file will never support package options!

Some code might be implemented to manipulate figures for full chickenization. However, I will *not* load any packages at this place, as loading of expl3 or TikZ or whatever takes too much time for such a tiny package like this one. If you want to use anything of the features presented here, you have to load the packages on your own. Maybe this will change.

```
\ProvidesPackage{chickenize}%
  [2011/10/22 v0.1 chickenize package]
\input{chickenize}
```

5.1 Definition of User-Level Macros

```
%% We want to "chickenize" figures, too. So …
```

```
\iffalse
  \DeclareDocumentCommand\includegraphics{O{}m}{
     \fbox{Chicken}  %% actually, I'd love to draw a mp graph showing a chicken …
  }
%%%% specials: the balmerpeak. A tribute to http://xkcd.com/323/.
%% So far, you have to load pgfplots yourself.
%% As it is a mighty package, I don't want the user to force loading it.
\NewDocumentCommand\balmerpeak{G{}O{-4cm}}{
%% to be done using Lua drawing.
}
\fi
```

6 Lua Module

This file contains all the necessary functions, sorted alphabetically, not by sense.

First, we set up some constants. These are made global so the code can be manipulated on document level, too.

```

local nodenew = node.new
local nodecopy = node.copy
local nodeinsertbefore = node.insert_before
local nodeinsertafter = node.insert_after
local noderemove = node.remove
local nodeid = node.id
local nodetraverseid = node.traverse_id

Hhead = nodeid("hhead")
RULE = nodeid("rule")
GLUE = nodeid("glue")
WHAT = nodeid("whatsit")
COL = node.subtype("pdf_colorstack")
GLYPH = nodeid("glyph")
```

Now we set up the nodes used for all color things. The nodes are whatsits of subtype `pdf_colorstack`.

```
color_push = nodenew(WHAT,COL)
color_pop = nodenew(WHAT,COL)
color_push.stack = 0
color_pop.stack = 0
color_push.cmd = 1
color_pop.cmd = 2
```

6.1 chickenize

The infamous `\chickenize` macro. Substitutes every word of the input with the given string. This can be elaborated arbitrarily, and whenever I feel like, I might add functionality.

So far, only the string replaces the word, and even hyphenation is not possible.

```
chicken_pagenumbers = true

chickenstring = {}
chickenstring[1] = "Chicken" -- chickenstring is a table, please remeber this!

chickenizefraction = 0.5
-- set this to a small value to fool somebody, or to see if your text has been read carefully. Thi

local tbl = font.getfont(font.current())
local space = tbl.parameters.space
local shrink = tbl.parameters.space_shrink
local stretch = tbl.parameters.space_stretch
local match = unicode.utf8.match
chickenize_ignore_word = false

chickenize_real_stuff = function(i,head)
    while ((i.next.id == 37) or (i.next.id == 11) or (i.next.id == 7) or (i.next.id == 0)) do  --i
      i.next = i.next.next
    end

    chicken = {}  -- constructing the node list.

-- Should this be done only once? No, then we loose the freedom to change the string in-document.
--but it could be done only once each paragraph as in-paragraph changes are not possible!

    chickenstring_tmp = chickenstring[math.random(1,#chickenstring)]
    chicken[0] = nodenew(37,1)  -- only a dummy for the loop
    for i = 1,string.len(chickenstring_tmp) do
      chicken[i] = nodenew(37,1)
      chicken[i].font = font.current()
      chicken[i-1].next = chicken[i]
    end

    j = 1
    for s in string.utfvalues(chickenstring_tmp) do
      local char = unicode.utf8.char(s)
      chicken[j].char = s
      if match(char,"%s") then
        chicken[j] = nodenew(10)
        chicken[j].spec = nodenew(47)
        chicken[j].spec.width = space
        chicken[j].spec.shrink = shrink
        chicken[j].spec.stretch = stretch
      end
      j = j+1
    end

    node.slide(chicken[1])
    lang.hyphenate(chicken[1])
    chicken[1] = node.kerning(chicken[1])    -- FIXME: does not work
    chicken[1] = node.ligaturing(chicken[1]) -- dito

    nodeinsertbefore(head,i,chicken[1])
    chicken[1].next = chicken[2] -- seems to be necessary … to be fixed
    chicken[string.len(chickenstring_tmp)].next = i.next
  return head
end

chickenize = function(head)
  for i in nodetraverseid(37,head) do  --find start of a word
    if (chickenize_ignore_word == false) then  -- normal case: at the beginning of a word, we jum
      head = chickenize_real_stuff(i,head)
    end

-- At the end of the word, the ignoring is reset. New chance for everyone.
    if not((i.next.id == 37) or (i.next.id == 7) or (i.next.id == 22) or (i.next.id == 11)) then
      chickenize_ignore_word = false
    end

-- and the random determination of the chickenization of the next word:
    if math.random() > chickenizefraction then
      chickenize_ignore_word = true
    end
  end
  return head
end

nicetext = function()
  texio.write_nl("Output written on "..tex.jobname..".pdf ("..status.total_pages.." chicken,".." 
  texio.write_nl(" ")
  texio.write_nl("----------------------------")
  texio.write_nl("Hello my dear user,")
  texio.write_nl("good job, now go outside and enjoy the world!")
  texio.write_nl(" ")
  texio.write_nl("And don't forget to feet your chicken!")
  texio.write_nl("----------------------------")
end
```

6.2 hammertime

This is a completely useless function. It just prints STOP! – HAMMERTIME at the beginnig of the first paragraph after `\hammertime`, and "U can't touch this" for every following one. As the function writes to the terminal, you have to be sure that your terminal is line-buffered and not block-buffered. Compare the explanation of Taco on the LuaTEX mailing list.[6]

```
hammertimedelay = 1.2
hammertime = function(head)
  if hammerfirst then
    texio.write_nl("==============================\n")
    texio.write_nl("============STOP!=============\n")
    texio.write_nl("==============================\n\n\n\n")
    os.sleep (hammertimedelay*1.5)
    texio.write_nl("==============================\n")
    texio.write_nl("==========HAMMERTIME==========\n")
    texio.write_nl("==============================\n\n\n")
    os.sleep (hammertimedelay)
    hammerfirst = false
  else
    os.sleep (hammertimedelay)
    texio.write_nl("==============================\n")
    texio.write_nl("======U can't touch this!=====\n")
    texio.write_nl("==============================\n\n\n")
    os.sleep (hammertimedelay*0.5)
  end
  return head
end
```

6.3 itsame

The (very first, very basic, very stupid) code to draw a small mario. You need to input luadraw.tex or do luadraw.lua for the rectangle function.

```
itsame = function()
local mr = function(a,b) rectangle({a*10,b*-10},10,10) end
color = "1 .6 0"
for i = 6,9 do mr(i,3) end
for i = 3,11 do mr(i,4) end
for i = 3,12 do mr(i,5) end
for i = 4,8 do mr(i,6) end
for i = 4,10 do mr(i,7) end
for i = 1,12 do mr(i,11) end
for i = 1,12 do mr(i,12) end
for i = 1,12 do mr(i,13) end
```

[6] http://tug.org/pipermail/luatex/2011-November/003355.html

```

color = ".3 .5 .2"
for i = 3,5 do mr(i,3) end mr(8,3)
mr(2,4) mr(4,4) mr(8,4)
mr(2,5) mr(4,5) mr(5,5) mr(9,5)
mr(2,6) mr(3,6) for i = 8,11 do mr(i,6) end
for i = 3,8 do mr(i,8) end
for i = 2,11 do mr(i,9) end
for i = 1,12 do mr(i,10) end
mr(3,11) mr(10,11)
for i = 2,4 do mr(i,15) end for i = 9,11 do mr(i,15) end
for i = 1,4 do mr(i,16) end for i = 9,12 do mr(i,16) end

color = "1 0 0"
for i = 4,9 do mr(i,1) end
for i = 3,12 do mr(i,2) end
for i = 8,10 do mr(5,i) end
for i = 5,8 do mr(i,10) end
mr(8,9) mr(4,11) mr(6,11) mr(7,11) mr(9,11)
for i = 4,9 do mr(i,12) end
for i = 3,10 do mr(i,13) end
for i = 3,5 do mr(i,14) end
for i = 7,10 do mr(i,14) end
end
```

6.4 leetspeak

The `leettable` is the substitution scheme. Just add items if you feel to. Maybe we will differ between a light-weight version and a hardcore 1337.

```
leet_onlytext = false
leettable = {
  [101] = 51, -- E
  [105] = 49, -- I
  [108] = 49, -- L
  [111] = 48, -- O
  [115] = 53, -- S
  [116] = 55, -- T

  [101-32] = 51, -- e
  [105-32] = 49, -- i
  [108-32] = 49, -- l
  [111-32] = 48, -- o
  [115-32] = 53, -- s
  [116-32] = 55, -- t
}
```

And here the function itself. So simple that I will not write any

```
leet = function(head)
  for line in nodetraverseid(Hhead,head) do
    for i in nodetraverseid(GLYPH,line.head) do
      if not(leetspeak_onlytext) or
         node.has_attribute(i,luatexbase.attributes.leetattr)
      then
        if leettable[i.char] then
          i.char = leettable[i.char]
        end
      end
    end
  end
  return head
end
```

6.5 letterspaceadjust

Yet another piece of code by Paul. This is primarily inteded for very narrow columns, but may also increase the overall quality of typesetting. Basically, it does nothing else than adding expandable space *between* letters. This way, the amount of stretching between words can be reduced and the greyness of a page (hopefully) comes out more equally.

Why the synonym `stealsheep`? Because of a comment of Paul on the `texhax` mailing list: http://tug.org/pipermail/texhax/2011-October/018374.html

6.5.1 setup of variables

```
local letterspace_glue = nodenew(nodeid"glue")
local letterspace_spec = nodenew(nodeid"glue_spec")
local letterspace_pen = nodenew(nodeid"penalty")

letterspace_spec.width   = tex.sp"0pt"
letterspace_spec.stretch = tex.sp"2pt"
letterspace_glue.spec    = letterspace_spec
letterspace_pen.penalty  = 10000
```

6.5.2 function implementation

```
letterspaceadjust = function(head)
  for glyph in nodetraverseid(nodeid"glyph", head) do
    if glyph.prev and (glyph.prev.id == nodeid"glyph") then
      local g = nodecopy(letterspace_glue)
      nodeinsertbefore(head, glyph, g)
      nodeinsertbefore(head, g, nodecopy(letterspace_pen))
    end
  end
  return head
end
```

6.6 matrixize

Substitutes every glyph by a representation of its ASCII value. Migth be extended to cover full unicode, but so far only 8bit is supported. The code is quite straight-forward and works ok. The line ends are not necessarily correcty adjusted. However, with microtype, i. e. font expansion, everything looks fine.

```
matrixize = function(head)
x = {}
s = nodenew(nodeid"disc")
  for n in nodetraverseid(nodeid"glyph",head) do
    j = n.char
    for m = 0,7 do -- stay ASCII for now
      x[7-m] = nodecopy(n) -- to get the same font etc.

      if (j / (2^(7-m)) < 1) then
        x[7-m].char = 48
      else
        x[7-m].char = 49
        j = j-(2^(7-m))
      end
      nodeinsertbefore(head,n,x[7-m])
      nodeinsertafter(head,x[7-m],nodecopy(s))
    end
    noderemove(head,n)
  end
  return head
end
```

6.7 pancakenize

Not yet completely decided what this should do, but it might come down to inserting a cooking receipe for a … well, guess what. Possible implementations are: Substitute a whole sentence, from full-stop to full-stop. OR: Substitute word-by-word at a random place. OR (expert-freak-1337-level): Substitute the n-th word of each page to a word of the receipe. That would be totally awesome!!

6.8 randomfonts

Traverses the output and substitutes fonts randomly. A check is done so that the font number is existing. One day, the fonts should be easily given explicitely in terms of `\bf` etc.

```
local randomfontslower = 1
local randomfontsupper = 0
%
randomfonts = function(head)
  if (randomfontsupper > 0) then  -- fixme: this should be done only once, no? Or at every paragra
    rfub = randomfontsupper  -- user-specified value
  else
    rfub = font.max()        -- or just take all fonts
  end
  for line in nodetraverseid(Hhead,head) do
    for i in nodetraverseid(GLYPH,line.head) do
      if not(randomfonts_onlytext) or node.has_attribute(i,luatexbase.attributes.randfontsattr) t
        i.font = math.random(randomfontslower,rfub)
      end
    end
  end
  return head
end
```

6.9 randomuclc

Traverses the input list and changes lowercase/uppercase codes.

```
uclcratio = 0.5 -- ratio between uppercase and lower case
randomuclc = function(head)
  for i in nodetraverseid(37,head) do
    if not(randomuclc_onlytext) or node.has_attribute(i,luatexbase.attributes.randuclcattr) then
      if math.random() < uclcratio then
        i.char = tex.uccode[i.char]
      else
        i.char = tex.lccode[i.char]
      end
    end
  end
  return head
end
```

6.10 randomchars

```
randomchars = function(head)
  for line in nodetraverseid(Hhead,head) do
    for i in nodetraverseid(GLYPH,line.head) do
      i.char = math.floor(math.random()*512)
    end
  end
  return head
end
```

6.11 randomcolor and rainbowcolor

Setup of the boolean for grey/color or rainbowcolor, and boundaries for the colors. rgb space is fully used, but greyscale is only used in a visible range, i. e. to 90% instead of 100% white.

```
randomcolor_grey = false
randomcolor_onlytext = false --switch between local and global colorization
rainbowcolor = false

grey_lower = 0
grey_upper = 900

Rgb_lower = 1
rGb_lower = 1
rgB_lower = 1
Rgb_upper = 254
rGb_upper = 254
rgB_upper = 254
```

Variables for the rainbow. 1/rainbow_step*5 is the number of letters used for one cycle, the color changes from red to yellow to green to blue to purple.

```
rainbow_step = 0.005
rainbow_Rgb = 1-rainbow_step -- we start in the red phase
rainbow_rGb = rainbow_step   -- values x must always be 0 < x < 1
rainbow_rgB = rainbow_step
rainind = 1          -- 1:red,2:yellow,3:green,4:blue,5:purple
```

This function produces the string needed for the pdf color stack. We need values 0]..[1 for the colors.

```
randomcolorstring = function()
  if randomcolor_grey then
    return (0.001*math.random(grey_lower,grey_upper)).." g"
  elseif rainbowcolor then
    if rainind == 1 then -- red
      rainbow_rGb = rainbow_rGb + rainbow_step
      if rainbow_rGb >= 1-rainbow_step then rainind = 2 end
    elseif rainind == 2 then -- yellow
      rainbow_Rgb = rainbow_Rgb - rainbow_step
      if rainbow_Rgb <= rainbow_step then rainind = 3 end
    elseif rainind == 3 then -- green
      rainbow_rgB = rainbow_rgB + rainbow_step
      rainbow_rGb = rainbow_rGb - rainbow_step
      if rainbow_rGb <= rainbow_step then rainind = 4 end
    elseif rainind == 4 then -- blue
      rainbow_Rgb = rainbow_Rgb + rainbow_step
      if rainbow_Rgb >= 1-rainbow_step then rainind = 5 end
    else -- purple
      rainbow_rgB = rainbow_rgB - rainbow_step
      if rainbow_rgB <= rainbow_step then rainind = 1 end
    end
    return rainbow_Rgb.." "..rainbow_rGb.." "..rainbow_rgB.." rg"
  else
    Rgb = math.random(Rgb_lower,Rgb_upper)/255
    rGb = math.random(rGb_lower,rGb_upper)/255
    rgB = math.random(rgB_lower,rgB_upper)/255
    return Rgb.." "..rGb.." "..rgB.." ".." rg"
  end
end
```

The function that does all the colorizing action. It goes through the whole paragraph and looks at every glyph. If the boolean `randomcolor_onlytext` is set, only glyphs with the set attribute will be colored. Elsewise, all glyphs are taken.

```
randomcolor = function(head)
  for line in nodetraverseid(0,head) do
    for i in nodetraverseid(37,line.head) do
      if not(randomcolor_onlytext) or
         (node.has_attribute(i,luatexbase.attributes.randcolorattr))
      then
        color_push.data = randomcolorstring()  -- color or grey string
        line.head = nodeinsertbefore(line.head,i,nodecopy(color_push))
        nodeinsertafter(line.head,i,nodecopy(color_pop))
      end
    end
  end
  return head
end
```

6.12 rickroll

Another tribute to pop culture. Either: substitute word-by-word as in pancake. OR: substitute each link to a youtube-rickroll …

6.13 tabularasa

Removes every glyph from the output and replaces it by empty space. In the end, nearly nothing will be visible. Should be extended to also remove rules or just anything that is visible.

```
tabularasa_onlytext = false

tabularasa = function(head)
  s = nodenew(nodeid"kern")
  for line in nodetraverseid(nodeid"hlist",head) do
    for n in nodetraverseid(nodeid"glyph",line.list) do
    if not(tabularasa_onlytext) or node.has_attribute(n,luatexbase.attributes.tabularasaattr) the
      s.kern = n.width
      nodeinsertafter(line.list,n,nodecopy(s))
      noderemove(line.list,n)
    end
    end
  end
  return head
end
```

6.14 uppercasecolor

Loop through all the nodes and checking whether it is uppercase. If so (and also for small caps), color it.

```
uppercasecolor = function (head)
  for line in nodetraverseid(Hhead,head) do
    for upper in nodetraverseid(GLYPH,line.head) do
      if (((upper.char > 64) and (upper.char < 91)) or
          ((upper.char > 57424) and (upper.char < 57451)))  then  -- for small caps! nice
        color_push.data = randomcolorstring()  -- color or grey string
        line.head = nodeinsertbefore(line.head,upper,nodecopy(color_push))
        nodeinsertafter(line.head,upper,nodecopy(color_pop))
      end
    end
  end
  return head
end
```

6.15 colorstretch

This function displays the amount of stretching that has been done for each line of an arbitrary document. A well-typeset document should be equally grey over all lines, which is not always possible.

In fact, two boxes are drawn: The first (left) box shows the badness, i. e. the amount of stretching the spaces between words. Too much space results in ligth gray, whereas a too dense line is indicated by a dark grey box.

The second box is only usefull if microtypographic extensions are used, e. g. with the `microtype` package under LaTeX. The box color then corresponds to the amount of font expansion in the line. This can be greatly used to show the positive effect of font expansion on the badness of a line!

The base structure of the following code is written by Paul Isambert. Thanks for the code and support, Paul!

Two booleans, `keeptext`, and `colorexpansion`, are used to control the behaviour of the function.

```
keeptext = true
colorexpansion = true

colorstretch_coloroffset = 0.5
colorstretch_colorrange = 0.5
chickenize_rule_bad_height = 4/5 -- height and depth of the rules
chickenize_rule_bad_depth = 1/5


colorstretchnumbers = true
drawstretchthreshold = 0.1
drawexpansionthreshold = 0.9
```

After setting the constants, the function starts. It receives the vertical list of the typeset paragraph as `head`, and loops through all horizontal lists.

If font expansion should be shown (`colorexpansion == true`), then the first glyph node is determined and its width compared with the width of the unexpanded glyph. This gives a measure for the expansion factor and is translated into a grey scale.

```
colorstretch = function (head)
 local f = font.getfont(font.current()).characters
 for line in nodetraverseid(Hhead,head) do
   local rule_bad = nodenew(RULE)

if colorexpansion then  -- if also the font expansion should be shown
     local g = line.head
       while not(g.id == 37) do
        g = g.next
       end
     exp_factor = g.width / f[g.char].width
     exp_color = colorstretch_coloroffset + (1-exp_factor)*10 .. " g"
     rule_bad.width = 0.5*line.width  -- we need two rules on each line!
   else
     rule_bad.width = line.width  -- only the space expansion should be shown, only one rule
   end
```

Height and depth of the rules are adapted to print a closed grey pattern, so no white interspace is left.

The glue order and sign can be obtained directly and are translated into a grey scale.

```
   rule_bad.height = tex.baselineskip.width*chickenize_rule_bad_height -- this should give a bet
   rule_bad.depth = tex.baselineskip.width*chickenize_rule_bad_depth

   local glue_ratio = 0
   if line.glue_order == 0 then
     if line.glue_sign == 1 then
```

```
      glue_ratio = colorstretch_colorrange * math.min(line.glue_set,1)
    else
      glue_ratio = -colorstretch_colorrange * math.min(line.glue_set,1)
    end
  end
  color_push.data = colorstretch_coloroffset + glue_ratio .. " g"

```

Now, we throw everything together in a way that works. Somehow …

```
-- set up output
  local p = line.head

-- a rule to immitate kerning all the way back
  local kern_back = nodenew(RULE)
  kern_back.width = -line.width

-- if the text should still be displayed, the color and box nodes are inserted additionally
-- and the head is set to the color node
  if keeptext then
    line.head = nodeinsertbefore(line.head,line.head,nodecopy(color_push))
  else
    node.flush_list(p)
    line.head = nodecopy(color_push)
  end
  nodeinsertafter(line.head,line.head,rule_bad)  -- then the rule
  nodeinsertafter(line.head,line.head.next,nodecopy(color_pop)) -- and then pop!
  tmpnode =  nodeinsertafter(line.head,line.head.next.next,kern_back)

  -- then a rule with the expansion color
  if colorexpansion then  -- if also the stretch/shrink of letters should be shown
    color_push.data = exp_color
    nodeinsertafter(line.head,tmpnode,nodecopy(color_push))
    nodeinsertafter(line.head,tmpnode.next,nodecopy(rule_bad))
    nodeinsertafter(line.head,tmpnode.next.next,nodecopy(color_pop))
  end
```

Now we are ready with the boxes and stuff and everything. However, a very useful information might be the amount of stretching, not encoded as color, but the real value. In concreto, I mean: narrow boxes get one color, loose boxes get another one, but only if the badness is above a certain amount. This information is printed into the right-hand margin. The threshold is user-adjustable.

```
  if colorstretchnumbers then
    j = 1
    glue_ratio_output = {}
    for s in string.utfvalues(math.abs(glue_ratio)) do -- using math.abs here gets us rid of the
      local char = unicode.utf8.char(s)
```

```
        glue_ratio_output[j] = nodenew(37,1)
        glue_ratio_output[j].font = font.current()
        glue_ratio_output[j].char = s
        j = j+1
      end
      if math.abs(glue_ratio) > drawstretchthreshold then
        if glue_ratio < 0 then color_push.data = "0.99 0 0 rg"
        else color_push.data = "0 0.99 0 rg" end
      else color_push.data = "0 0 0 rg"
      end

      nodeinsertafter(line.head,node.tail(line.head),nodecopy(color_push))
      for i = 1,math.min(j-1,7) do
        nodeinsertafter(line.head,node.tail(line.head),glue_ratio_output[i])
      end
      nodeinsertafter(line.head,node.tail(line.head),nodecopy(color_pop))
    end -- end of stretch number insertion
  end
  return head
end
```

And that's it! ☺

Well, it's not the whole story so far. I plan to test some drawing using only Lua code, writing directly to the pdf file. This section will grow and get better in parallel to my understandings of what's going on. I.e. it will be very slowly … Nothing here is to be taken as good and/or correct LuaTeXing, and most code is plain ugly. However, it kind of works already ☺

7 Drawing

A *very* first, experimental implementation of a drawing of a chicken. The parameters should be consistent, easy to change and that monster should look more like a cute chicken. However, it is chicken, it is Lua, so it belongs into this package. So far, all numbers and positions are hard coded, this will of course change!

```
--
function pdf_print (...)
  for _, str in ipairs({...}) do
    pdf.print(str .. " ")
  end
  pdf.print("\string\n")
end

function move (p)
  pdf_print(p[1],p[2],"m")
end

function line (p)
  pdf_print(p[1],p[2],"l")
end

function curve(p1,p2,p3)
  pdf_print(p1[1], p1[2],
            p2[1], p2[2],
            p3[1], p3[2], "c")
end

function close ()
  pdf_print("h")
end

function linewidth (w)
  pdf_print(w,"w")
end

function stroke ()
  pdf_print("S")
```

```
end
--

function strictcircle(center,radius)
  local left = {center[1] - radius, center[2]}
  local lefttop = {left[1], left[2] + 1.45*radius}
  local leftbot = {left[1], left[2] - 1.45*radius}
  local right = {center[1] + radius, center[2]}
  local righttop = {right[1], right[2] + 1.45*radius}
  local rightbot = {right[1], right[2] - 1.45*radius}

  move (left)
  curve (lefttop, righttop, right)
  curve (rightbot, leftbot, left)
stroke()
end

function disturb_point(point)
  return {point[1] + math.random()*5 - 2.5,
          point[2] + math.random()*5 - 2.5}
end

function sloppycircle(center,radius)
  local left = disturb_point({center[1] - radius, center[2]})
  local lefttop = disturb_point({left[1], left[2] + 1.45*radius})
  local leftbot = {lefttop[1], lefttop[2] - 2.9*radius}
  local right = disturb_point({center[1] + radius, center[2]})
  local righttop = disturb_point({right[1], right[2] + 1.45*radius})
  local rightbot = disturb_point({right[1], right[2] - 1.45*radius})

  local right_end = disturb_point(right)

  move (right)
  curve (rightbot, leftbot, left)
  curve (lefttop, righttop, right_end)
  linewidth(math.random()+0.5)
  stroke()
end

function sloppyline(start,stop)
  local start_line = disturb_point(start)
  local stop_line = disturb_point(stop)
  start = disturb_point(start)
  stop = disturb_point(stop)
  move(start) curve(start_line,stop_line,stop)
  linewidth(math.random()+0.5)
  stroke()
end
```

8 Known Bugs

The behaviour of the `\chickenize` macro is under construction and everything it does so far is considered a feature.

babel Using `chickenize` with `babel` leads to a problem with the " character, as it is made active: When using `\chickenizesetup` *after* `\begin{document}`, you can *not* use " for strings, but you have to use '. No problem really, but take care of this.

9 To Dos

Some things that should be implemented but aren't so far or are very poor at the moment:

rainbowcolor should be more flexible – the angle of the rainbow should be easily adjustable.

pancakenize should do something funny.

chickenize should differ between character and punctuation.

swing swing dancing apes – that will be very hard, actually …

chickenmath chickenization of math mode

10 Literature

The following list directs you to helpful literature that will help you to better understand the concepts used in this package and for in-depth explanation. Also, most of the code here is taken from or based on this literature, so it is also a list of references somehow:

- LuaTEX documentation – the manual and links to presentations and talks: `http://www.luatex.org/documentation.html`
- The Lua manual, for Lua 5.1: `http://www.lua.org/manual/5.1/`
- Programming in Lua, 1st edition, aiming at Lua 5.0, but still (largely) valid for 5.1: `http://www.lua.org/pil/`
-

11 Thanks

This package would not have been possible without the help of many people that patiently answered my annoying questions on mailing lists and in personal mails. And of course not without the work of the LuaTeX team!

Special thanks go to Paul "we could have chickenized the world" Isambert who contributed a lot of ideas, code and bug fixes and made much of the code executable at all.