# The `l3charts` package

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https://git.itsufficient.me/latex/l3charts

**Abstract**

This package defines a few simple TikZ charts that can be drawn using LaTeX environments. This has mainly been developed as an experimentation of `expl3` for checking what LaTeX3 really brought to facilitate package development (expansion control, seq, prop, keys, int, bool, fp, dim, ...).

## Contents

# 1 About this documentation

I doubt that LaTeX will have one day a modern documentation system as powerful as `cargo doc` due to its typeless and syntaxless nature. In my opinion LaTeX literate programming with `docstrip` is just an ugly hack that turns the code and the documentation unmaintainable, and it's probably the component of LaTeX which aged the most.

So I chose to write the documentation separately and borrowed much of the style from the `microtype` package which by the way, pushes the `docstrip` mastery to a *black magic* level.

# 2 Kiviat chart

## 2.1 Usage

The kiviat chart or *radar chart* allows to represent one or several set along several dimensions.

`\begin{kiviatchart}` Environment that hold a kiviat chart. Accepts an optional argument `[`⟨*clist*⟩`]` which is comma separated list of keywords and values :
`\end{kiviatchart}`

`radius` ⟨*dim*⟩ `3.5cm`
Maximal diagram radius

`units` ⟨*int*⟩ `5`
Set the scale of units from 0 to the given number

`*` ⟨*keyval*⟩
All other options are passed to `tikzpicture` (*env*)

A `kiviatchart` (*env*) should begin with a `dims` (*env*), followed by one or several `set` (*env*).

### 2.1.1 Dimensions

`\begin{dims}` Environment that hold the definition of all dimensions. Accepts an optional argument `[`⟨*clist*⟩`]` which is comma separated list of keywords and values :
`\end{dims}`

`radius` ⟨*dim*⟩ `=kiviatchart radius`
Radius to put dimension labels on

`label-on` ⟨*int*⟩ `1`
Dimension axis index (between 1 and number of dimensions) to put the labels on. In case of invalid value (0), the units labels are hidden.

`dim-options` ⟨*prop*⟩ `{opacity=0.8}`
TikZ options for drawing dimensions axis with

`unit-options` ⟨*prop*⟩ `{opacity=0.3}`
TikZ options for drawing unit polygons with

`label-options` ⟨*prop*⟩ `{opacity=0.5,above,xshift=1.5mm}`
TikZ options drawing for unit labels

`label-cs` ⟨*str*⟩ `identity`
Name of the cs used to format labels

`unit-cs` ⟨*str*⟩ `tinytt`
Name of the cs used to format unit scale

`angle` ⟨*fp*⟩ `90`
Angle of the first dimension

`\value` `\value[`⟨*clist*⟩`]{`⟨*label*⟩`}` is used to add a dimension to the kiviat chart. `[`⟨*clist*⟩`]` is passed to TikZ to draw the nodes corresponding to the labels.

### 2.1.2 Set

`\begin{set}` `\end{set}`

`set` (*env*) is used to add a new set to the kiviat chart. Accepts an optional argument `[`⟨*clist*⟩`]` which is comma separated list of keywords and values :

`dot-options` ⟨*prop*⟩ `{fill,circle,inner sep=1pt}`

Options for polygon node

`*` ⟨*keyval*⟩ `color=black,line width=1.5pt,opacity=1,fill opacity=0.3,fill=gray`

All other options are passed to `\draw` cs which draws the polygon

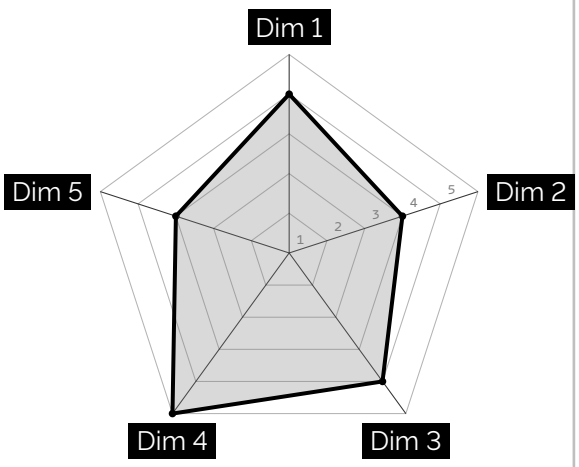
`\value` `\value{`⟨*int*⟩`}` is used to add a value to the set.

There must be the same number of `\value` inside `set` (*env*) and `dims` (*env*), and each `\value` corresponds to the dimension in `dims` (*env*) at the same index.

## 2.2 Examples

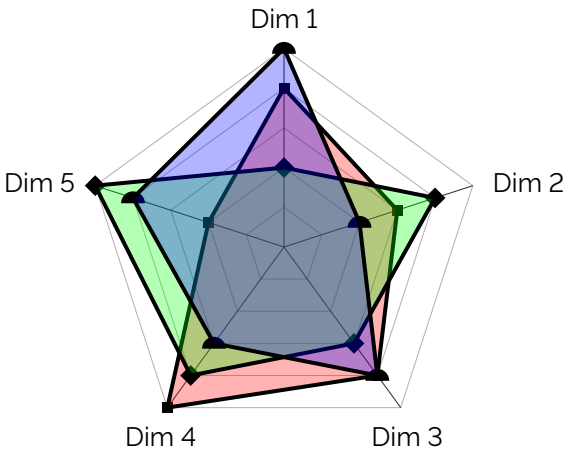
### 2.2.1 Simple

Use `label-cs` to call `\textinv` to format the labels.




```
% scale is passed to tikzpicture
\begin{kiviatchart}[scale=0.75]
  % Define all the dimensions
  \begin{dims}[
      label-cs=textinv,
      label-on=2]
    % Specify placement of each
    % labels
    \value[above]{Dim 1}
    \value[right]{Dim 2}
    \value[below]{Dim 3}
    \value[below]{Dim 4}
    \value[left]{Dim 5}
  \end{dims}
  % Add one or several sets.
  % Each value corresponds to
  % the dimension at the same
  % index in dims
  \begin{set}
    \value{4}
    \value{3}
    \value{4}
    \value{5}
    \value{3}
  \end{set}
\end{kiviatchart}
```

### 2.2.2 Multi-set




```
% scale is passed to tikzpicture
\begin{kiviatchart}[scale=0.75]
  \begin{dims}[
      % bigger radius for labels
      radius=3.7cm,
      % hide unit labels
      label-on=0]
    \value[above]{Dim 1}
    \value[right]{Dim 2}
    \value[below]{Dim 3}
    \value[below]{Dim 4}
    \value[left]{Dim 5}
  \end{dims}
  % red set
  \begin{set}[
      fill=red,
      % big rectangle dots
      dot-options={
        fill,rectangle,
        inner sep=2pt
      }]
    \value{4}
    \value{3}
    \value{4}
    \value{5}
    \value{2}
  \end{set}
  % green set
  \begin{set}[
      fill=green,
      % big diamond dots
      dot-options={
        fill,diamond,
        inner sep=2pt
      }]
    \value{2}
    \value{4}
    \value{3}
    \value{4}
    \value{5}
  \end{set}
  % blue set
  \begin{set}[
      fill=blue,
      % big semicircle dots
      dot-options={
        fill,semicircle,
        inner sep=2pt
      }]
    \value{5}
    \value{2}
    \value{4}
    \value{3}
    \value{4}
  \end{set}
\end{kiviatchart}
```

## 2.3 To do

At the moment the environments are not user friendly. We could provide basic sanity checks, with error messages when theses rules are violated :

- one and only one `dims` (*env*) declared before any `set` (*env*)
- at least 3 dimensions are declared
- all `set` (*env*) have the same number of `\value` than the `dims` (*env*)
- `\value` in `set` (*env*) is between 0 and `units`

# 3 Ball chart

## 3.1 Usage

`\begin{ballchart}` `\end{ballchart}` Environment that hold a ball chart. Accepts an optional argument `[`⟨*clist*⟩`]` which is comma separated list of keywords and values :

`n` ⟨*int*⟩ `5`
The number of circles per bar

`gap` ⟨*dim*⟩ `1ex`
Gap between bars

`cgap` ⟨*dim*⟩ `1pt`
Gap between circles

`radius` ⟨*dim*⟩ `2.5mm`
Radius of the circles

`label-cs` ⟨*str*⟩ `identity`
Macro name to format labels

`fill-options` ⟨*prop*⟩ `{fill=black}`
Ti*k*Z options to fill the balls with

`draw-options` ⟨*prop*⟩ `{draw=none}`
Ti*k*Z options to draw the balls with

`label-options` ⟨*prop*⟩ `{left}`
Ti*k*Z options for dimensions axis

`label-cs` ⟨*str*⟩ `identity`
Macro name to format labels

`label-pos` ⟨*str*⟩ `left`
Position of the label

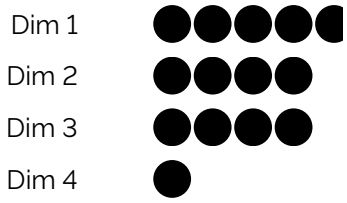
`value-cs` ⟨*str*⟩ `nop`
cs name to format values with

`*` ⟨*keyval*⟩
All other options are passed to `tikzpicture` (*env*)

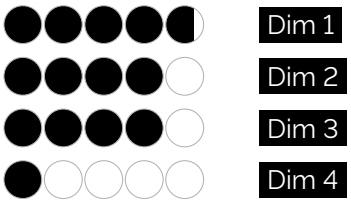
`\value` `\value{`⟨*label*⟩`}{`⟨*percent*⟩`}` is used to add a new bar.

## 3.2 Examples

### 3.2.1 Simple

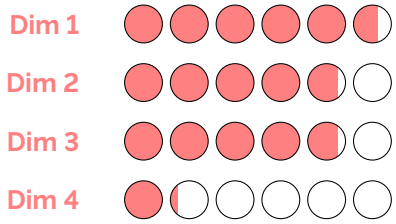



```
\begin{ballchart}
  \value{Dim 1}{95}
  \value{Dim 2}{80}
  \value{Dim 3}{80}
  \value{Dim 4}{20}
\end{ballchart}
```




```
\begin{ballchart}[
    % inverted labels
    label-cs=textinv,
    % to the right
    label-pos=right,
    % closer to the bar
    label-options={xshift=-8mm},
    % show circle
    draw-options={draw=black!30}]
  \value{Dim 1}{95}
  \value{Dim 2}{80}
  \value{Dim 3}{80}
  \value{Dim 4}{20}
\end{ballchart}
```

### 3.2.2 Delimited




```
\begin{ballchart}[
    % 6 circles per bar
    n=6,
    % red labels
    label-cs=redbf,
    % closer to bar
    label-options={xshift=4mm},
    % bigger gap
    gap=1.5ex,
    cgap=3pt,
    % fill in red
    fill-options={fill=red!50},
    % black circle
    draw-options={draw=black}]
  \value{Dim 1}{95}
  \value{Dim 2}{80}
  \value{Dim 3}{80}
  \value{Dim 4}{20}
\end{ballchart}
```

# 4 Bar chart

## 4.1 Usage

`\begin{barchart}` `\end{barchart}` Environment that hold a bar chart. Accepts an optional argument `[`⟨*clist*⟩`]` which is comma separated list of keywords and values :

`width` ⟨*dim*⟩ `3cm`

Maximum width

`height` ⟨*dim*⟩ `3.5mm`

Bar height

`gap` ⟨*dim*⟩ `1ex`
Gap between bars

`fill-options` ⟨*prop*⟩ `{fill=none}`
TikZ options to fill the bar with

`draw-options` ⟨*prop*⟩ `{fill=black}`
TikZ options to draw the bar with

`label-options` ⟨*prop*⟩ `{}`
TikZ options for dimensions axis

`label-cs` ⟨*str*⟩ `identity`
Macro name to format labels

`label-pos` ⟨*str*⟩ `left`
Position of the label

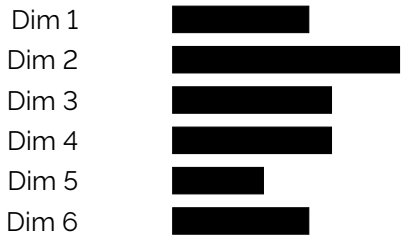
`value-cs` ⟨*str*⟩ `nop`
cs name to format values with

`*` ⟨*keyval*⟩
All other options are passed to `tikzpicture` (*env*)

`\value` `\value{`⟨*label*⟩`}{`⟨*percent*⟩`}` is used to add a new bar.

## 4.2 Examples

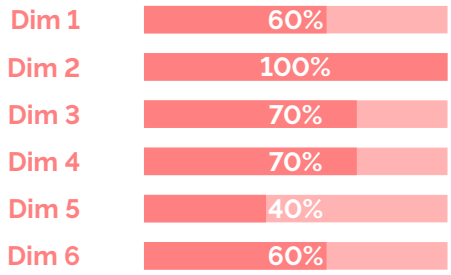
### 4.2.1 Simple




```
\begin{barchart}
  \value{Dim 1}{60}
  \value{Dim 2}{100}
  \value{Dim 3}{70}
  \value{Dim 4}{70}
  \value{Dim 5}{40}
  \value{Dim 6}{60}
\end{barchart}
```


```
\begin{barchart}[
    % inverted labels
    label-cs=textinv,
    % to the right
    label-pos=right,
    % closer to bar
    label-options={xshift=-8mm}]
  \value{Dim 1}{60}
  \value{Dim 2}{100}
  \value{Dim 3}{70}
  \value{Dim 4}{70}
  \value{Dim 5}{40}
  \value{Dim 6}{60}
\end{barchart}
```

### 4.2.2 Gauge




```
\begin{barchart}[
    % 4cm wide bars
    width=4cm,
    % inverted labels
    label-cs=redbf,
    % closer to bar
    label-options={xshift=4mm},
    % show values
    value-cs=whitebfp,
    % bigger gap
    gap=1.5ex,
    % bar in red
    draw-options={
      draw=red!50,
      fill=red!50},
    % show borders in red
    fill-options={
      fill=red!30,
      draw=red!30}]
  \value{Dim 1}{60}
  \value{Dim 2}{100}
  \value{Dim 3}{70}
  \value{Dim 4}{70}
  \value{Dim 5}{40}
  \value{Dim 6}{60}
\end{barchart}
```

# 5 Bubble chart

## 5.1 Usage

`\begin{bubblechart}` `\end{bubblechart}` Environment that hold a bubble chart. Accepts an optional argument `[`⟨*clist*⟩`]` which is comma separated list of keywords and values :

`radius` ⟨*dim*⟩ `1cm`
Max radius

`gap` ⟨*dim*⟩ `1ex`
Gap between bubbles

`fill-options` ⟨*prop*⟩ `{fill=none,draw=none}`
TikZ options to fill/draw the background with

`draw-options` ⟨*prop*⟩ `{fill=black}`
TikZ options to fill/draw the bubble with

`label-cs` ⟨*str*⟩ `identity`
Macro name to format labels

`label-pos` ⟨*str*⟩ `above`
Position of the label

`value-cs` ⟨*str*⟩ `nop`
cs name to format values with

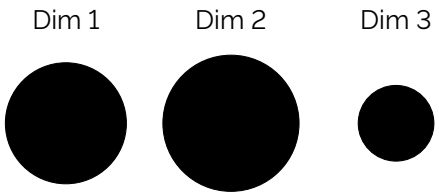
`vertical` ⟨*bool*⟩ `false`
Stack the bubble vertically instead of horizontally

`*` ⟨*keyval*⟩
All other options are passed to `tikzpicture` (*env*)

`\value` `\value{⟨label⟩}{⟨percent⟩}` is used to add a new bubble.

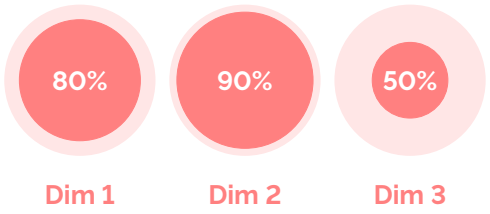
## 5.2 Examples

### 5.2.1 Horizontal



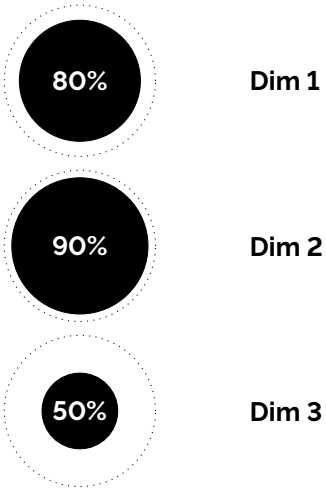

```
\begin{bubblechart}
  \value{Dim 1}{80}
  \value{Dim 2}{90}
  \value{Dim 3}{50}
\end{bubblechart}
```


```
\begin{bubblechart}[
    % inverted labels
    label-cs=textinv,
    % below bubble
    label-pos=below,
    % show borders
    fill-options={
      fill=none,
      draw=black!30}]
  \value{Dim 1}{80}
  \value{Dim 2}{90}
  \value{Dim 3}{50}
\end{bubblechart}
```




```
\begin{bubblechart}[
    % label in red
    label-cs=redbf,
    % below bubble
    label-pos=below,
    % show value
    value-cs=whitebfp,
    % bubble in red
    draw-options={
      draw=red!50,
      fill=red!50},
    % background in light red
    fill-options={
      fill=red!10}]
  \value{Dim 1}{80}
  \value{Dim 2}{90}
  \value{Dim 3}{50}
\end{bubblechart}
```

### 5.2.2 Vertical




```
\begin{bubblechart}[
    % stack bubbles vertically
    vertical,
    % label in bold
    label-cs=textbf,
    % show values
    value-cs=whitebfp,
    % to the right
    label-pos=right,
    % show max as dotted line
    fill-options={
      fill=none,
      draw=black,
      dotted}]
  \value{Dim 1}{80}
  \value{Dim 2}{90}
  \value{Dim 3}{50}
\end{bubblechart}
```

# 6 Radial chart

## 6.1 Usage

`\begin{radialchart}` Environment that hold a radial chart. Accepts an optional argument `[`⟨*clist*⟩`]` which is comma separated list of keywords and values :
`\end{radialchart}`

`radius` ⟨*dim*⟩ `1cm`
Max radius

`gap` ⟨*dim*⟩ `2.5ex`
Gap between radials

`fill-options` ⟨*prop*⟩ `{fill=none,draw=black!10}`
TikZ options to fill/draw the center of the radial with

`draw-options` ⟨*prop*⟩ `black`
TikZ options to draw the radial with

`label-options` ⟨*prop*⟩ `{}`
TikZ options drawing for unit labels

`label-cs` ⟨*str*⟩ `identity`
cs name to format labels with

`label-pos` ⟨*str*⟩ `above`
Label position relative to radial

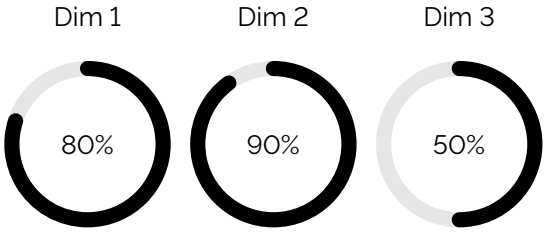
`value-cs` ⟨*str*⟩ `identity`
cs name to format values with

`vertical` ⟨*bool*⟩ `false`
Stack radials vertically instead of horizontally

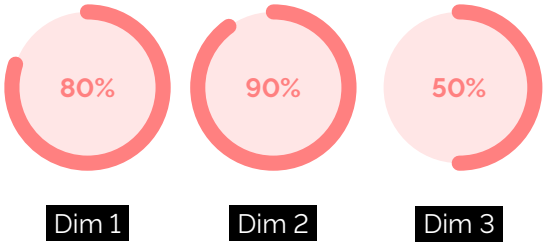
`*` ⟨*keyval*⟩ `line width=2mm,line cap=round`
All other options are passed to `tikzpicture` (*env*)

## 6.2 Examples

### 6.2.1 Horizontal

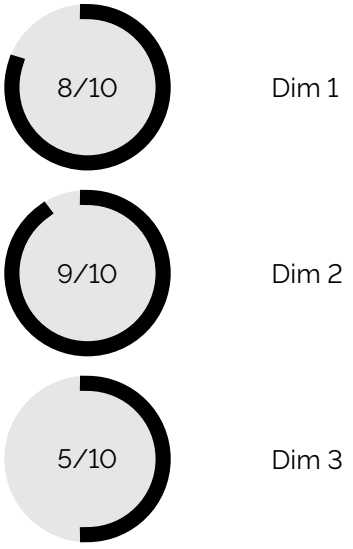



```
\begin{radialchart}
  \value{Dim 1}{80}
  \value{Dim 2}{90}
  \value{Dim 3}{50}
\end{radialchart}
```




```
\begin{radialchart}[
    % inverted label,
    label-cs=textinv,
    % below radial,
    label-pos=below,
    % in red bold.
    value-cs=redbfp,
    % ring is red
    draw-options={red!50},
    % disk is light red
    fill-options={
      fill=red!10}]
  \value{Dim 1}{80}
  \value{Dim 2}{90}
  \value{Dim 3}{50}
\end{radialchart}
```

### 6.2.2 Vertical




```
\begin{radialchart}[
    % stack radials vertically
    vertical,
    % label as tenth fraction
    value-cs=tenrate,
    % to the right
    label-pos=right,
    % rect ring
    line cap=rect,
    % same color for disk and ring
    fill-options={
      draw=black!10,
      fill=black!10}]
  \value{Dim 1}{80}
  \value{Dim 2}{90}
  \value{Dim 3}{50}
\end{radialchart}
```

# 7 Macros

## 7.1 Package

These are macros defined in `l3charts.sty` and used as default value for `label-cs` or `value-cs` options.

`\tinytt` Macro used to format its argument as tiny monospace

```
\cs_set:Npn \tinytt #1 {\texttt{\tiny #1}}
```

`\identity` Macro used to return the first argument as is

```
\cs_set:Npn \identity #1 {#1}
```

`\nop` Macro used to consume the first argument and do nothing

```
\cs_set:Npn \nop #1 {}
```

`\percent` Macro used to append a percent to its argument

```
\cs_set:Npn \percent #1 {#1\%}
```

### 7.2 Examples

These macros are defined for the examples presented in this document and are not part of the module `l3charts.sty`.

`\textbfp` Macro used to format its argument as bold with appended %

```
\NewDocumentCommand\textbfp{m}{\textbf{\percent{#1}}}
```

`\tenrate` Macro used to format its argument as fraction of ten

```
\ExplSyntaxOn
\NewDocumentCommand\tenrate{m}{\int_eval:n{#1/10}/10}
\ExplSyntaxOff
```

`\textinv` Macro used to format its argument as white text on black background

```
\NewDocumentCommand\textinv{m}{\colorbox{black}{\textcolor{white}{#1}}}
```

`\redbf` Macro used to format its argument as bold and red

```
\NewDocumentCommand\redbf{m}{\textcolor{red!50}{\textbf{#1}}}
```

`\redbfp` Macro used to format its argument as bold and red with appended %

```
\NewDocumentCommand\redbfp{m}{\textcolor{red!50}{\textbfp{#1}}}
```

`\whitebf` Macro used to format its argument as bold and white

```
\NewDocumentCommand\whitebf{m}{\textcolor{white}{\textbf{#1}}}
```

`\whitebfp` Macro used to format its argument as bold and white with appended %

```
\NewDocumentCommand\whitebfp{m}{\textcolor{white}{\textbfp{#1}}}
```

## 8 Index

Numbers in upright shape refer to the *page* where the corresponding entry is described (bold face) resp. occurs.

**Options**

# 9 Changes

### 0.6.1 (2022/07/26)

- add a `label-on` option for `dims` (*env*) of `kiviatchart` (*env*)

### 0.6.0 (2022/07/26)

- draw `kiviatchart` (*env*) dimensions clockwise with a starting `angle` of 90
- allow value of 0 for `set` (*env*)
- rename `labels-radius` to `radius` and move to `dims` (*env*)

### 0.5.1 (2022/07/19)

- remove hard coded % in value.

### 0.5.0 (2022/07/18)

- convert all $\langle fp \rangle$ to $\langle dim \rangle$ for usability
- rename `v-sep` and `h-sep` options of `ballchart` (*env*) to `gap` and `cgap` for consistency

### 0.4.0 (2022/07/17)

- add values to `bubblechart` (*env*)
- label positioning on `barchart` (*env*) and `ballchart` (*env*)
- swap `fill-options` and `draw-options` for `barchart` (*env*) for consistency

### 0.3.0 (2022/07/15)

- add a `radialchart` (*env*) to draw radials
- add a vertical mode to `bubblechart` (*env*) and allow positioning of the label
- swap `fill-options` and `draw-options` for `bubblechart` (*env*) for consistency

### 0.2.0 (2022/07/04)

- define a document class borrowed from `microtype`

### 0.1.0 (2022/07/01)

- Initial version