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
`\end{kiviatchart}` separated list of keywords and values :

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*⟩]
`\end{dims}` which is comma separated list of keywords and values :

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} set (*env*) is used to add a new set to the kiviat chart. Accepts an optional argument [⟨*clist*⟩]
\end{set} 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

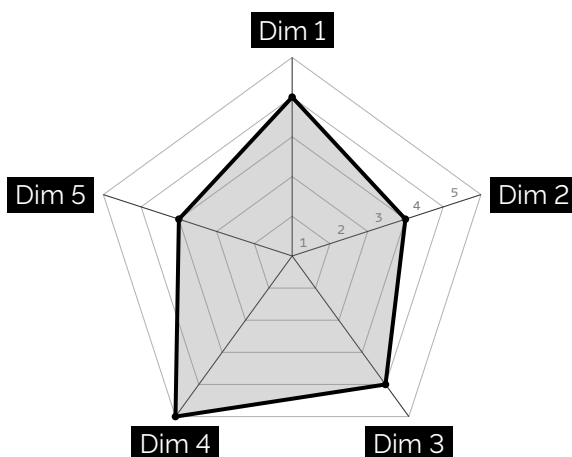All other options are passed to \draw cs which draws the polygon

\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
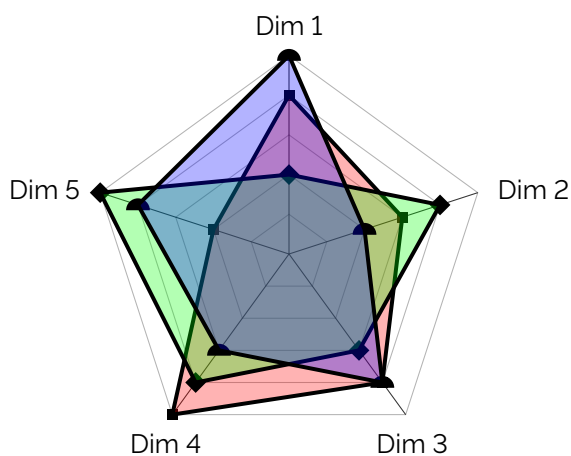
```
% scale is passed to tikzpicture
\begin{kiviatchart}[scale=0.75]
  \begin{dims}[
      % bigger radius for labels
      radius=3.7cm,
      % hide unit labels
      label-on=0]
    \value[above]{Dim 1}
    \value[right]{Dim 2}
    \value[below]{Dim 3}
    \value[below]{Dim 4}
    \value[left]{Dim 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`
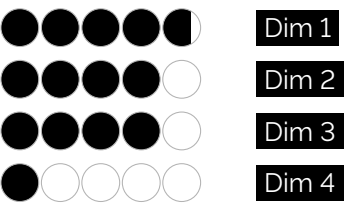
3 Ball chart

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}
	TikZ options to fill the balls with	
draw-options	⟨*prop*⟩	{draw=none}
	TikZ options to draw the balls with	
label-options	⟨*prop*⟩	{left}
	TikZ options for dimensions axis	
label-cs	⟨*str*⟩	identity
	Macro name to format labels	
label-pos	⟨*str*⟩	left
	Position of the label. Should be `left`, `right`, `above`, `below`, `above right`, `above left`, `below right` or `below left`	
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

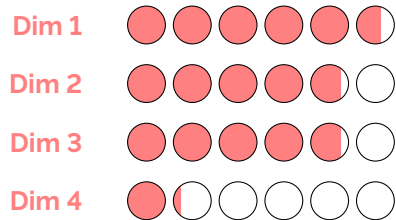### 3.2.1 Simple
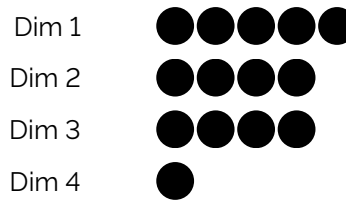

```
\begin{ballchart}
  \value{Dim 1}{95}
  \value{Dim 2}{80}
  \value{Dim 3}{80}
  \value{Dim 4}{20}
\end{ballchart}
```



```
\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}
```
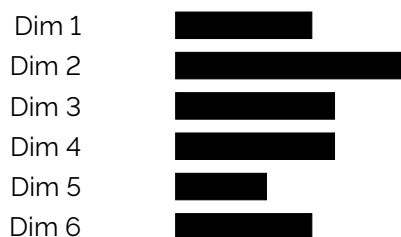
4 Bar chart

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. Should be `left`, `right`, `above`, `below`, `above right`, `above left`, `below right` or `below left`

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

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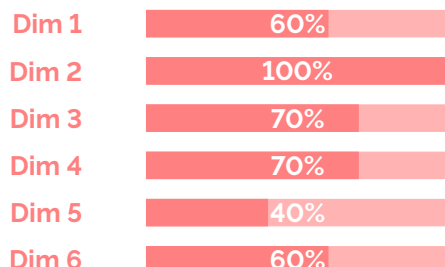
```
\begin{barchart}
  \value{Dim 1}{60}
  \value{Dim 2}{100}
  \value{Dim 3}{70}
  \value{Dim 4}{70}
  \value{Dim 5}{40}
  \value{Dim 6}{60}
\end{barchart}
```

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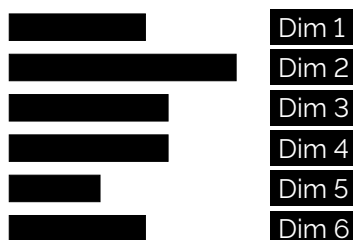
```
\begin{barchart}[
    % inverted labels
    label-cs=textinv,
    % to the right
    label-pos=right,
    % closer to bar
    label-options={xshift=-8mm}]
  \value{Dim 1}{60}
  \value{Dim 2}{100}
  \value{Dim 3}{70}
  \value{Dim 4}{70}
  \value{Dim 5}{40}
  \value{Dim 6}{60}
\end{barchart}
```

4.2.2 Gauge

Dim 1	60%
Dim 2	100%
Dim 3	70%
Dim 4	70%
Dim 5	40%
Dim 6	60%

```
\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}
```
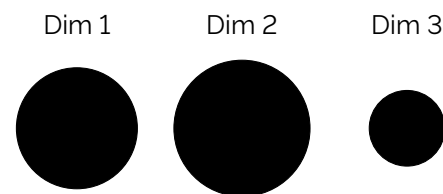
5 Bubble chart

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. Should be `left`, `right`, `above`, `below`, `above right`, `above left`, `below right` or `below left`

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

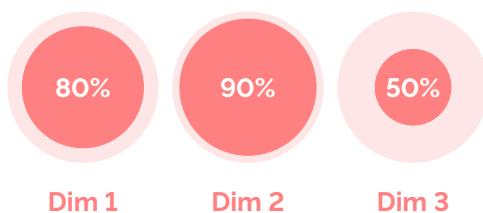### 5.2.1 Horizontal

Dim 1   Dim 2   Dim 3

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

Dim 1   Dim 2   Dim 31
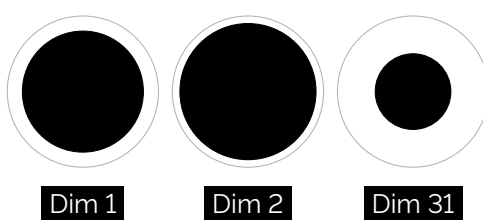
```
\begin{bubblechart}[
    % inverted labels
    label-cs=textinv,
    % below bubble
    label-pos=below,
    % show borders
    fill-options={
      fill=none,
      draw=black!30}]
  \value{Dim 1}{80}
  \value{Dim 2}{90}
  \value{Dim 31}{50}
\end{bubblechart}
```

80%   90%   50%

Dim 1   Dim 2   Dim 3

```
\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
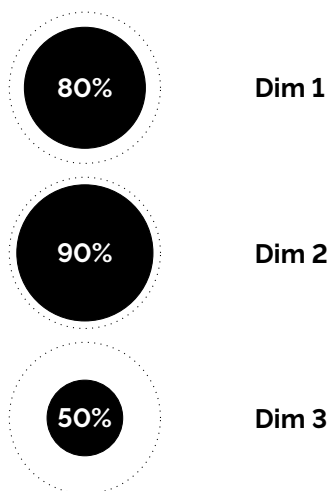

```
\begin{bubblechart}[
    % stack bubbles vertically
    vertical,
    % label in bold
    label-cs=textbf,
    % show values
    value-cs=whitebfp,
    % to the right
    label-pos=right,
    % show max as dotted line
    fill-options={
      fill=none,
      draw=black,
      dotted}]
  \value{Dim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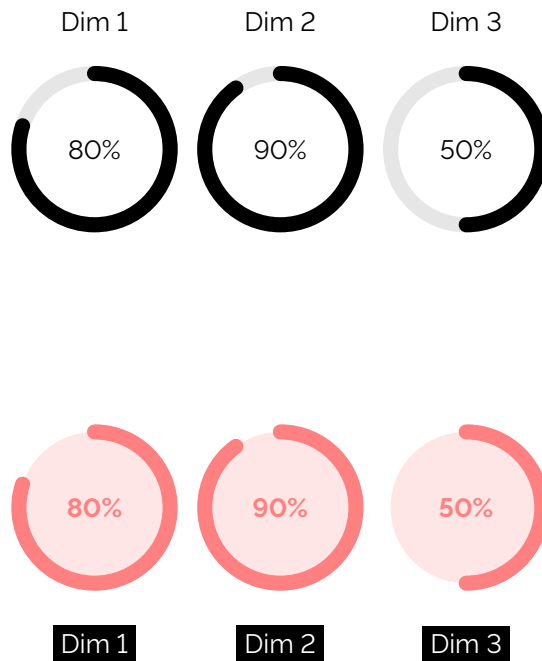
6 Radial chart

6.1 Usage

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

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
Position of the label. Should be left, right, above, below, above right, above left,
below right or below left

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

Dim 1   Dim 2   Dim 3

80%   90%   50%

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

80%   90%   50%

Dim 1   Dim 2   Dim 3

```
\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

8/10   Dim 1

9/10   Dim 2

5/10   Dim 3
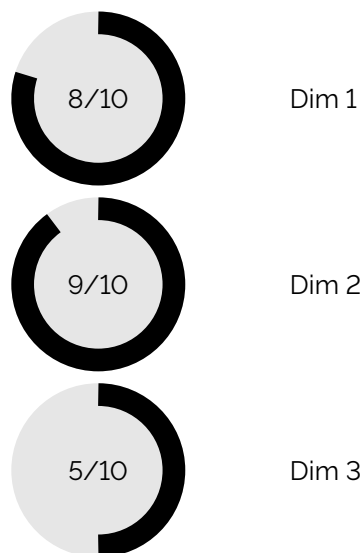
```
\begin{radialchart}[
    % stack radials vertically
    vertical,
    % label as tenth fraction
    value-cs=tenrate,
    % to the right
    label-pos=right,
    % thicker line
    line-width=3mm,
    % with rect end
    line cap=butt,
    % same color for disk and ring
    fill-options={
      draw=black!10,
      fill=black!10}]
  \value{Dim 1}{80}
  \value{Dim 2}{90}
  \value{Dim 3}{50}
\end{radialchart}
```

7 Circle chart

7.1 Usage

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

     radius   ⟨*dim*⟩   1cm

                 Max radius

gap	⟨*dim*⟩	2.5ex
	Gap between radials	
line-width	⟨*dim*⟩	4mm
	Line width to draw the circles with	
fill-options	⟨*prop*⟩	{fill=none,draw=black!10}
	Ti*k*Z options to fill/draw the center of the radial with	
draw-options	⟨*prop*⟩	black
	Ti*k*Z options to draw the radial with	
label-options	⟨*prop*⟩	{}
	Ti*k*Z options drawing for unit labels	
label-cs	⟨*str*⟩	identity
	cs name to format labels with	
label-pos	⟨*str*⟩	right
	Label position relative to radial. Should be `left center` or `right`	
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*)	

7.2 Examples

7.2.1 Simple


```
\begin{circlechart}
  \value{Dim 1}{100}
  \value{Dim 2}{90}
  \value{Dim 3}{60}
  \value{Dim 4}{45}
\end{circlechart}
```

7.2.2 Colorful
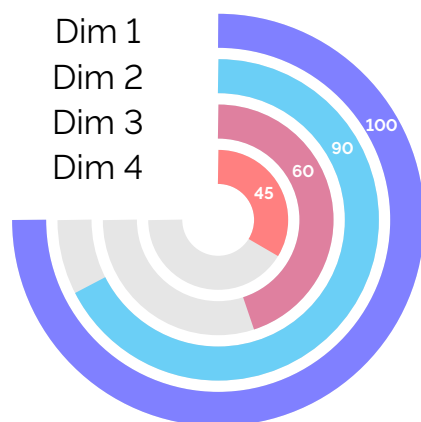
```
\begin{circlechart}[
    % bigger radius,
    radius=2.5cm,
    % and gap
    gap=1.5mm,
    % show values
    value-cs=whitebf,
    % at 30°
    value-angle=30,
    % centered labels
    label-pos=center,
    % thicker line width,
    line-width=4.5mm,
    % with square end
    line cap=butt]
% each ring has its own color
    \value[blue!50]{Dim 1}{100}
    \value[cyan!50]{Dim 2}{90}
    \value[purple!50]{Dim 3}{60}
    \value[red!50]{Dim 4}{45}
\end{circlechart}
```

8 Macros

8.1 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\%}
```

8.2 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}}}`

9   Index

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

10 Changes

0.7.0 (2022/08/01)

- add a `circlechart` (*env*)
- use choice to restrict values on several keys (`label-pos`)

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