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	
label-radius	⟨*dim*⟩	3.5cm
	Radius to put dimension labels on	
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 :

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,below}
	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	

`\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

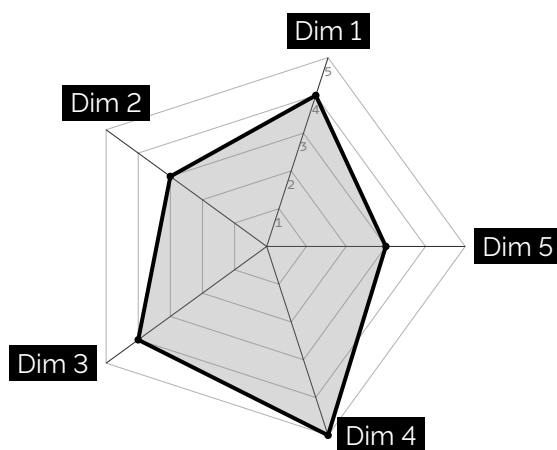`\value`   `\value{⟨int⟩}` is used to add a value to the set.

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]
    % Specify placement of each
    % labels
    \value[above]{Dim 1}
    \value[above]{Dim 2}
    \value[left]{Dim 3}
    \value[right]{Dim 4}
    \value[right]{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
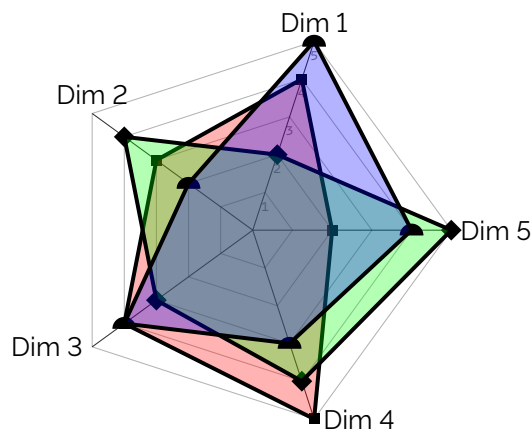
```
% scale is passed to tikzpicture
\begin{kiviatchart}[scale=0.75]
  \begin{dims}
    \value[above]{Dim 1}
    \value[above]{Dim 2}
    \value[left]{Dim 3}
    \value[right]{Dim 4}
    \value[right]{Dim 5}
  \end{dims}
  % Fill this set in red
  % with rectangle dots
  \begin{set}[
      fill=red,
      dot-options={
        fill,rectangle,
        inner sep=2pt
      }]
    \value{4}
    \value{3}
    \value{4}
    \value{5}
    \value{2}
  \end{set}
  % Fill this set in green
  % with diamond dots
  \begin{set}[
      fill=green,
      dot-options={
        fill,diamond,
        inner sep=2pt
      }]
    \value{2}
    \value{4}
    \value{3}
    \value{4}
    \value{5}
  \end{set}
  % Fill this set in blue
  % with semicircle dots
  \begin{set}[
      fill=blue,
      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*)
- 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

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

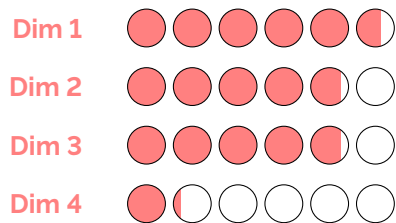### 3.2.1 Simple
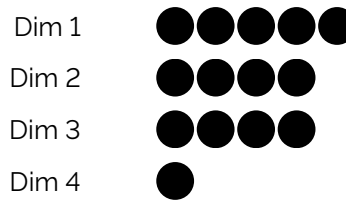

```latex
\begin{ballchart}
  \value{Dim 1}{95}
  \value{Dim 2}{80}
  \value{Dim 3}{80}
  \value{Dim 4}{20}
\end{ballchart}
```
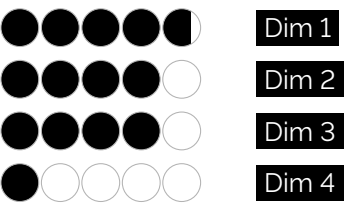


```latex
\begin{ballchart}[
    % inverted labels
    label-cs=textinv,
    % to the right
    label-pos=right,
    % closer to the bar
    label-options={xshift=-8mm},
    % show circle
    draw-options={draw=black!30}]
  \value{Dim 1}{95}
  \value{Dim 2}{80}
  \value{Dim 3}{80}
  \value{Dim 4}{20}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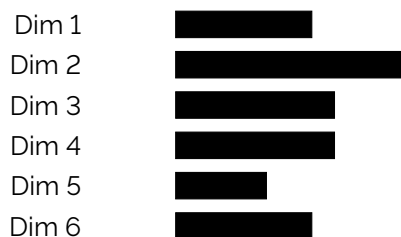
3.2.2 Delimited


```latex
\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

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
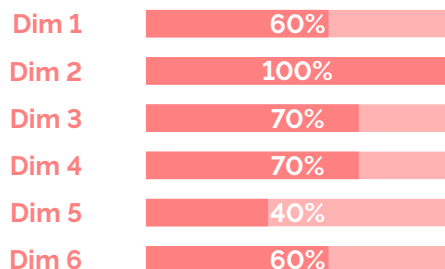

```
\begin{barchart}[
    % 4cm wide bars
    width=4cm,
    % inverted labels
    label-cs=redbf,
    % closer to bar
    label-options={xshift=4mm},
    % show values
    value-cs=whitebf,
    % bigger gap
    gap=1.5ex,
    % bar in red
    draw-options={
      draw=red!50,
      fill=red!50},
    % 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
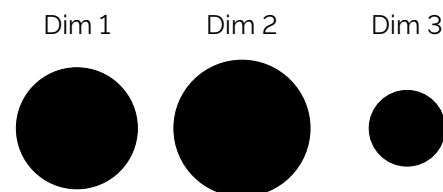

```
\begin{bubblechart}
  \value{Dim 1}{80}
  \value{Dim 2}{90}
  \value{Dim 3}{50}
\end{bubblechart}
```
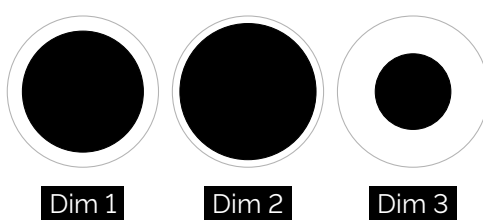


```
\begin{bubblechart}[
    % inverted labels
    label-cs=textinv,
    % below bubble
    label-pos=below,
    % show borders
    fill-options={
      fill=none,
      draw=black!30}]
  \value{Dim 1}{80}
  \value{Dim 2}{90}
  \value{Dim 3}{50}
\end{bubblechart}
```
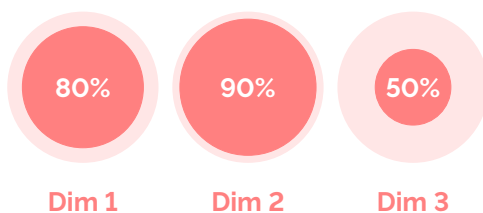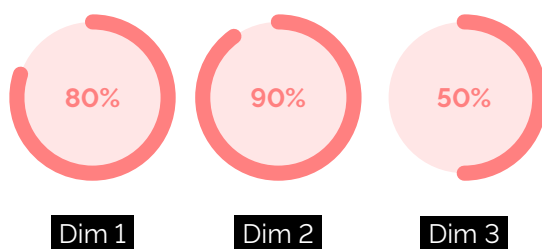


```
\begin{bubblechart}[
    % label in red
    label-cs=redbf,
    % below bubble
    label-pos=below,
    % show value
    value-cs=whitebf,
    % bubble in red
    draw-options={
      draw=red!50,
      fill=red!50},
    % background in light red
    fill-options={
      fill=red!10}]
  \value{Dim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

5.2.2 Vertical
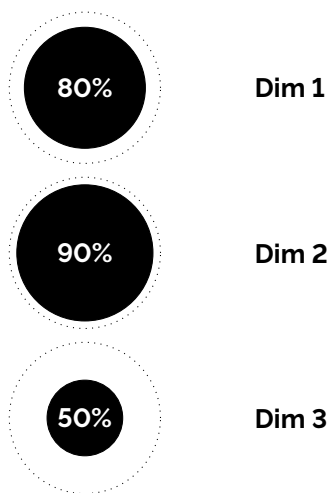

```
\begin{bubblechart}[
    % stack bubbles vertically
    vertical,
    % label in bold
    label-cs=textbf,
    % show values
    value-cs=whitebf,
    % to the right
    label-pos=right,
    % show max as dotted line
    fill-options={
      fill=none,
      draw=black,
      dotted}]
  \value{Dim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

6 Radial chart

6.1 Usage

\begin{radialchart}
\end{radialchart}

Environment that hold a radial chart. Accepts an optional argument [⟨*clist*⟩] which is comma 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
	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

Dim 1   Dim 2   Dim 3

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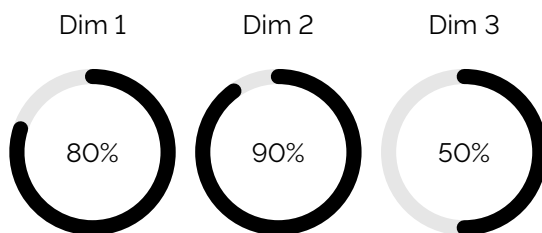
```
\begin{radialchart}
  \value{Dim 1}{80}
  \value{Dim 2}{90}
  \value{Dim 3}{50}
\end{radialchart}
```

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=redbf,
    % 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

80%   Dim 1
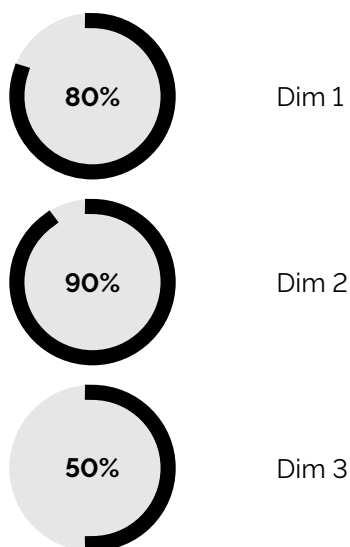
90%   Dim 2

50%   Dim 3

```
\begin{radialchart}[
    % stack radials vertically
    vertical,
    % bold label
    value-cs=textbf,
    % 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 {}`

7.2   Examples

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

`\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}}}`

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

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

8   Index

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

9 Changes

0.5.0 (2022/07/18)

- convert all ⟨*fp*⟩ to ⟨*dim*⟩ 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