# A key/value interface for generating LaTeX floats: the keyfloat package

Brian Dunn

bd@BDTechConcepts.com

March 7, 2017

### Abstract

The keyfloat package provides a key/value user interface for quickly creating figures with a single image each, figures with arbitrary contents, tables, subfloats, rows of floats, floats located [H]ere, floats in the [M]argin, and floats with text [W]rapped around them, using a consistent syntax for all.

Key/value combinations may specify a caption and label, a width proportional to `\linewidth`, a fixed width and/or height, rotation, scaling, a tight or loose frame, an `\arraystretch`, a continued float, additional supplemental text, and an artist/author's name with automatic index entry. When used with the tocdata package, the name also appears in the List of Figures.

Floats may be placed into a multi-row environment, and are typeset to fit within the given number of columns, continuing to the next rows as necessary. Nested sub-rows may be used to generate layouts such as two small figures placed vertically next to one larger figure.

Subfloats are supported by two environments.

As an example, a typical command to include a figure with a framed image of half `\linewidth` could be:
```
\keyfig*[hbp]{f,lw=.5,c={A caption},
    l={fig:label}}{image}
```

## A problem with floats

When including a figure with a graphics image into a document, the user typically enters something such as:

```
\begin{figure}
\centering
\includegraphics[width=3in]{filename}
\caption{A Figure}
\label{fig:somelabel}
\end{figure}
```

When doing that often enough, it makes sense to factor the common code:

```
\onefigure[3in]{filename}{A Figure}
    {fig:somelabel}
```

Expanding the capability of `\onefigure` via the xparse package can lead to the general case of:

```
\onefigure*[loc](width){filename}
    (add'l text)
    [shortcap]{caption}*[label]
```

Attempting to add additional features such as frames and continued floats hits the limit of nine parameters for a TeX macro, requiring that new features use some kind of change-state macros instead. Attempting to support rows of floats or subfloats only makes things more complicated still.

A key/value system solves the problem of adding more features, does not require much additional typing, is a more self-documenting syntax, and allows a shared syntax with subfloats and groups of floats as well. Thus, the keyfloat package.

## The keyfloat package

Using keyfloat, the previous example becomes:

```
\keyfig{w=3in,c=A Figure,l=fig:somelabel}
    {filename}
```

The \onefigure general case becomes:

```
\keyfig*[loc]{w=width,t={add'l text},
    sc=shortcap,cstar=caption,
    l=label}{filename}
```

### Macros and environments

keyfloat provides macros and environments to create figures and floats:

**\keyfig*[**⟨*loc*⟩**]{**⟨*keys*⟩**}{**⟨*image*⟩**}**
    A figure with an image.

**\keyfigbox*[**⟨*loc*⟩**]{**⟨*keys*⟩**}{**⟨*contents*⟩**}**
    A figure with arbitrary contents.

**\keyparbox*[**⟨*loc*⟩**]{**⟨*keys*⟩**}{**⟨*contents*⟩**}**
    A "figure" without a caption, useful to place uncaptioned text inside a group.

**\keytab*[**⟨*loc*⟩**]{**⟨*keys*⟩**}{**⟨*tabular*⟩**}**
    A table.

**keyfigure*[**⟨*loc*⟩**]{**⟨*keys*⟩**}**
    A figure environment.

**keytable*[**⟨*loc*⟩**]{**⟨*keys*⟩**}**
    A table environment.

### Groups of floats and subfloats

Floats may be gathered into groups, as well as gathered into a subfloat, using these environments:

**keyfloats*[**⟨*loc*⟩**]{**⟨*#cols*⟩**}**
> A group of rows and columns of floats.

**keysubfigs*[**⟨*loc*⟩**]{**⟨*#cols*⟩**}{**⟨*keys*⟩**}**
> A figure containing a group of rows and columns of subfigures.

**keysubtabs*[**⟨*loc*⟩**]{**⟨*#cols*⟩**}{**⟨*keys*⟩**}**
> A table containing a group of rows and columns of subtables.

### Margin float

The tufte-book class offers margin floats. These are used if they are available, otherwise keyfloat provides its own:

**marginfigure[**⟨*offset*⟩**]**
> A figure environment placed into the margin.

**margintable[**⟨*offset*⟩**]**
> A table environment placed into the margin.

### Arranging floats

Rows and columns of floats are created by enclosing \keyfig and friends inside a keyfloats environment. The number of columns is given, and the floats are dynamically arranged across each row, with leftovers distributed evenly on the last row. These may be nested (Figures 1 to 5, and Table 1).

```
\begin{keyfloats}{2}
\keyfig{lw=1,f,c={First in a group},
    l=fig:firstinrow,
    tl={\cs{raggedright} text}
    }{image}
\keyparbox{}{\centering
    A \cs{keyparbox} describing something.
    \par With several paragraphs.}
\begin{keyfloats}{2}
\keyfig{lw=1,c={Third in a group},
    l=fig:thirdinarow}{image}
\keyfig{lw=1,c={Fourth in a group}}{image2}
\keyfig{lw=1,c={Fifth in a group}}{image}
\keyfig{lw=1,c={Sixth in a group},
    l=fig:sixthinrow}{image2}
\end{keyfloats}
\keytab{c={Seventh in a group},
    l=tab:seventhinrow}
    {\testwidetable}
\end{keyfloats}
```

*An image.*

A \keyparbox describing something.

With several paragraphs.

\raggedright text

Figure 1: First in a group

*An image.*

Another image

Figure 2: Third in a group

Figure 3: Fourth in a group

Table 1: Seventh in a group

*An image.*

Another image

| A | B | C |
|---|---|---|
| D | E | F |

Figure 4: Fifth in a group

Figure 5: Sixth in a group

An image.

Some text

(a) First subfigure

Another image

Lots of lots of lots of lots of text.

(b) Second subfigure

An image.

(c) Third subfigure

(d) Fourth subfigure

| A | B |
| C | D |

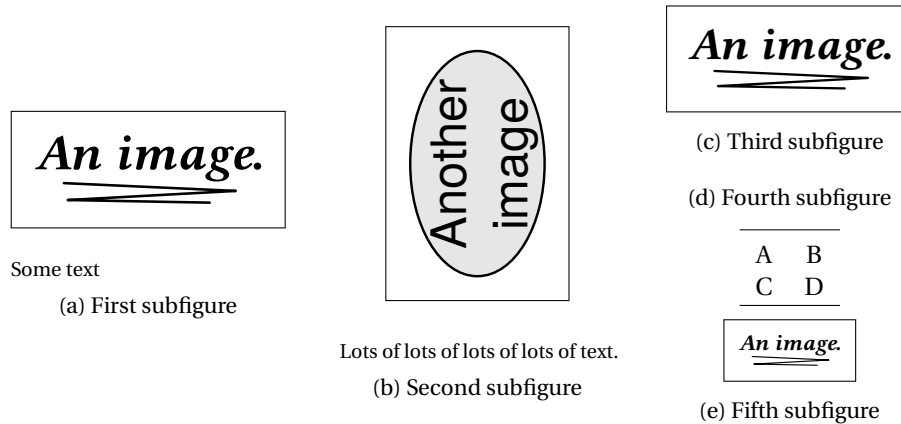An image.

(e) Fifth subfigure

Figure 6: Subfigures

## Arranging subfloats

Subfloats are arranged into rows and columns in a similar manner (Fig. 6). Notice that fig. 6(d) is a foreign table inside a figure.

```
\begin{keysubfigs}{3}
  {c=Subfigures,l=fig:subfigs}
\keyfig{lw=1,f,c={First subfigure},
  l=fig:firstsubfig,t=Some text}{image}
\keyfig{lw=1,f,r=90,c={Second subfigure},
  l=fig:secondsubfig,
  t=Lots of lots of lots of lots of text.}
  {image2}
\begin{keyfloats}{1}
\keyfig{lw=1,f,c={Third subfigure},
  l=fig:thirdsubfig}{image}
\keytab{c={Fourth subfigure},
  l=fig:fourthsubfig}{\testtable}
\keyfig{lw=.5,f,c={Fifth subfigure},
  l=fig:fifthsubfig}{image}
\end{keyfloats}
\end{keysubfigs}
```

## Placement of floats

Floats or groups of floats may be placed [H]ere, in the [M]argin, with text [W]rapped around them (wrapfig with optional placement), or with the usual [htbp] placement combinations.

Starred floats may be used to create two-column floats.

<div align="center">

Mr. First Last III

*About the illustration.*

Figure 7: An artist's work

</div>

### Options controlled by key/values

Most of the keys are one or two letters long, allowing them to be entered quickly.

Continued floats are available to repeat the previous float's number.

Tabular `\arraystretch` may be set per table.

An image inside a figure may be sized, rotated, and placed inside a tight, loose, or custom frame. Boxes of arbitrary contents may be sized and framed. Along with a fixed width or height, contents may also be sized as a fraction of `\linewidth`. Doing so allows them to automatically scale appropriately as they are moved into or out of groups of floats or subfloats.

Additional descriptive text may be placed inside the float with left/right/center alignments, and an artist/author's name may be added as well (Fig. 7):

```
\keyfig{ft,lw=1,
  ap=Mr.,af=First,al=Last,as={~III},
  tc={\textit{About the illustration.}},
  c=An artist's work,l=fig:artist}{image}
```
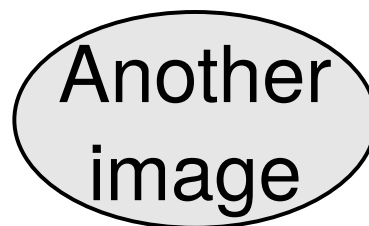
Subfloats may be used to create a collection (Fig. 8):

```
\begin{keysubfigs}{2}{
  c=Artist's collection,
  l=fig:artistcollection,
  t={Some fully-justified text just
  for illustrative purposes, in case you
  have a use for long explanations.
  This text may be the full \cs{linewidth}
  in size. \par
```

*An image.*

Another image

(a) Artist's First Work

Commentary about the work.

(b) Artist's Second Work

Prefix First Last, Suffix

Some fully-justified text just for illustrative purposes, in case you have a use for long explanations. This text may be the full `\linewidth` in size.

Multiple paragraphs of text are allowed.

Figure 8: Artist's collection

```
    Multiple paragraphs of text are
    allowed.},
    ap=Prefix,af=First,al=Last,as={, Suffix}
}
  \keyfig{lw=1,c=Artist's First Work}
    {image}
  \keyfig{lw=1,c=Artist's Second Work,
    tl={Commentary about the work.}}
    {image2}
\end{keysubfigs}
```

## Customizations

User-redefinable macros are provided for tight and loose frames. A loose frame is meant to add a bit of margin around the object, such as a closely cropped diagram, and is the usual case. A tight frame is useful around a photograph, giving a visual definition to its edge. The user must set a certain LaTeX length for each type of frame, equal to the total width of each frame and margin. These lengths are used to compute the final size of the float contents.

The caption package is used by keyfloat, and customized caption settings may be used for figures, tables, subfigures/tables, and wrapped figures/tables.

As usual, `\floatsep` and `\dblfloatsep` may be used to spread out the floats on the page.

**Examples**

The keyfloat documentation has more than thirty examples demonstrating code fragments and the corresponding results, as well as solutions for several special cases, such as frames using mdframed and fancybox.