

The subcaption package*

Axel Sommerfeldt
`caption@sommerfee.de`

2008/01/12

Abstract

This tiny package demonstrates the sub-caption feature of the caption package.

Introduction



Prepared with either `\DeclareCaptionSubType` (offered by the caption package) or `\newsubfloat` (offered by the subfig package), the caption package option `subtype` becomes available, causing `\caption` to typeset a sub-caption instead of an ordinary one.

This package demonstrates the usage of `\DeclareCaptionSubType`, `\captionsetup{subtype}`, and the internal hook `\caption@subtypehook`.

Contents

1	The user interface	2
1.1	The <code>\subcaption</code> command	3
1.2	The subfigure & subtable environments	4
1.3	The <code>\subcaptionbox</code> command	5
1.4	The <code>\subref</code> command	7
1.5	The <code>\DeclareCaptionSubType</code> command	7
1.6	Where do hyperlinks jump?	8
2	Beyond this package	8
3	Thanks	8
4	The implementation	9
4.1	Identification	9
4.2	Initial code	9
4.3	Execution of options	9
4.4	Main code	9

Please note: This package is incompatible with the subfigure and subfig packages.

*This package has version number v0.3, last revised 2007/12/06.

1 The user interface

Just load this package after the caption package, e.g.:

```
\usepackage[options]{caption}  
\usepackage[options]{subcaption}
```

The options for the subcaption package are the same ones as for the caption package, but specify settings which are used for sub-captions *additionally*. In fact

```
\usepackage[options]{subcaption}
```

is identical to

```
\usepackage{subcaption}  
\captionsetup[sub]{options}
```

The default settings for subcaptions are:

```
margin=0pt, font+=small, labelformat=parens, labelsep=space,  
skip=6pt, list=false, hypcap=false1
```

Options specified with `\usepackage[...]{subcaption}` and `\captionsetup[sub]{...}` will override the ones specified by `\captionsetup{...}` and `\captionsetup[figure]{...}`, but are again overwritten by `\captionsetup[subfigure]{...}` (same for ‘table’).

So finally we have the following order how settings for sub-captions are applied:

1. global settings (`\usepackage[...]{caption}` and `\captionsetup{...}`)
2. environmental settings (`\captionsetup[figure -or- table]{...}`)
3. local settings (`\captionsetup{...}` inside figure or table environment)
4. default ‘sub’ settings (`margin=0pt, font+=small, ...`, see above)
5. custom ‘sub’ settings (`\usepackage[...]{subcaption}` and `\captionsetup[sub]{...}`)
6. environmental ‘sub’ settings (`\captionsetup[subfigure -or- subtable]{...}`)
7. local ‘sub’ settings (`\captionsetup{...}` inside subfigure or subtable)

An example:

```
\usepackage[labelsep=quad, indentation=10pt]{caption}  
\usepackage[labelfont=bf, list=true]{subcaption}  
\captionsetup[table]{textfont=it, position=top}  
\captionsetup[subtable]{textfont=sf}
```

causes the captions inside subtable environments to be typeset with the settings

```
indentation=10pt, position=top, margin=0pt, font=small,  
labelformat=parens, labelsep=space, skip=6pt, hypcap=false,  
labelfont=bf, list=true, textfont=sf .
```

¹This means that sub-captions are not listed in the List of Figures or Tables by default, but (of course) you can enable that by specifying the option `list=true`.

1.1 The `\subcaption` command

`\subcaption` The easiest and most flexible method to apply a sub-caption is by using the `\subcaption` command. Its syntax is analogous to the one of the `\caption` command and shares its features:

```
\subcaption[<list entry>]{<heading>}  
\subcaption*{<heading>}
```

Please note that the `\subcaption` command *must* be applied inside its own box or environment.


An example:

```
\begin{figure}  
  \begin{minipage}[b]{.5\linewidth}  
    \centering\large A  
    \subcaption{A subfigure}\label{fig:1a}  
  \end{minipage}%  
  \begin{minipage}[b]{.5\linewidth}  
    \centering\large B  
    \subcaption{Another subfigure}\label{fig:1b}  
  \end{minipage}  
  \caption{A figure}\label{fig:1}  
\end{figure}
```

gives the result:

A	B
(a) A subfigure	(b) Another subfigure

Figure 1: A figure

 Actually the `\subcaption` command is just a simple combination of `\captionsetup{sub-type*}` and `\caption`. Analogous to the `type` option, the `subtype` option (both offered by the `caption` package) sets the sub-type of the box or environment (so `\caption` will typeset a sub-caption instead of an ordinary one), places a proper hyperlink anchor (non-starred variant only), executes options associated with the sub-type etc.

1.2 The subfigure & subtable environments

`subfigure` After loading the `subcaption` package the new environments `subfigure` and `subtable`
`subtable` are available, which have the same (optional & mandatory) arguments as the `minipage` environment. Inside these environments you use the ordinary `\caption` command for typesetting captions. So this example is identical to the last one, but uses the `subfigure` environment:

```
\begin{figure}
  \begin{subfigure}[b]{.5\linewidth}
    \centering\large A
    \caption{A subfigure}\label{fig:1a}
  \end{subfigure}%
  \begin{subfigure}[b]{.5\linewidth}
    \centering\large B
    \caption{Another subfigure}\label{fig:1b}
  \end{subfigure}
  \caption{A figure}\label{fig:1}
\end{figure}
```

Using the `subfigure` or `subtable` environment instead of `\subcaption` has two (little) advantages:

- You can override the settings for a specific subcaption with a `\captionsetup` inside the `subfigure` or `subtable` environment, e.g.:

```
...
\begin{subfigure}[b]{.5\linewidth}
  \centering\large A
  \captionsetup{skip=3pt}
  \caption{A subfigure}\label{fig:1a}
\end{subfigure}
...
```

- Hyperlinks pointing to this subfigure will jump to the beginning of the subfigure, and not to the caption of the subfigure (if `hypcap=true` is set for sub-captions). (See [section 1.6: Where do hyperlinks jump?](#))



The `subfigure` & `subtable` environments are just simple `minipage` environments with `\captionsetup{subtype}` as first contents line. These environments are defined with the help of `\caption@For{subtypelist}`, which executes code for every sub-type declared with `\DeclareCaptionSubType`.

1.3 The `\subcaptionbox` command

`\subcaptionbox` A more powerful (but less flexible) way of setting sub-figures is offered by the `\subcaptionbox` command. Its syntax is:

```
\subcaptionbox[⟨list entry⟩]{⟨heading⟩}[⟨width⟩][⟨inner-pos⟩]{⟨contents⟩}
\subcaptionbox*{⟨heading⟩}[⟨width⟩][⟨inner-pos⟩]{⟨contents⟩}
```

The arguments `⟨list entry⟩` & `⟨heading⟩` will be used for typesetting the `\caption`.

`⟨width⟩` is the width of the resulting `\parbox`; the default value is the width of the contents.

`⟨inner-pos⟩` specifies how the contents will be justified inside the resulting `\parbox`; it can be either ‘c’ (for `\centering`), ‘l’ (for `\raggedright`), ‘r’ (for `\raggedleft`), or ‘s’ (for no special justification). The default is ‘c’. (But you can use any justification defined with `\DeclareCaptionJustification` as well, e.g. ‘centerlast’.)

Using `\subcaptionbox`, the baseline of the resulting box will be placed right between contents and heading, so usually you don’t have to care about the vertical alignment of the sub-figures for yourself. Also the hyperlink anchor is placed properly with respect to the `hycap=` setting.

One example:

```
\begin{figure}
\centering
\subcaptionbox{A cat\label{cat}}
{\includegraphics{cat}}
\subcaptionbox{An elephant\label{elephant}}
{\includegraphics{elephant}}
\caption{Two animals\label{animals}}
\end{figure}
```

gives the result:

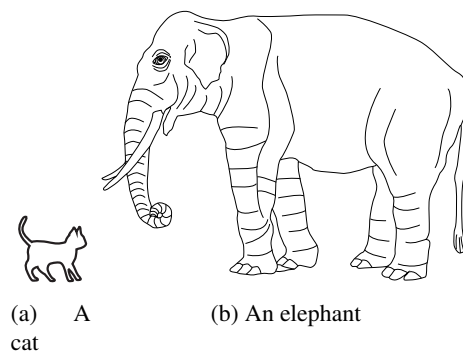


Figure 2: Two animals²

As you see the result is not satisfying; the caption below the cat looks ugly because of the small width of the graphic. This can be solved by using the optional arguments of `\captionbox`, increasing the width of the resulting box:

²The pictures were taken with permission from the L^AT_EX Companion[1] examples.

```
...
\subcaptionbox{A cat\label{cat}}
[2.5cm]{\includegraphics{cat}}
...
```

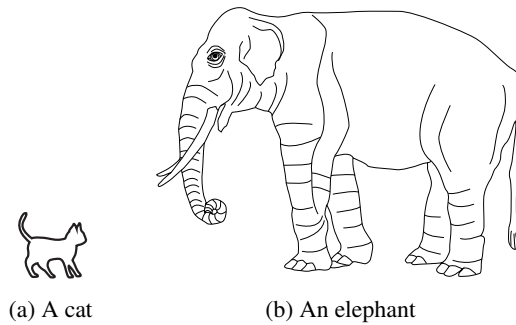


Figure 3: Two animals

Furthermore the main caption, which is centered with respect to the `\textwidth`, looks mis-aligned with respect to the sub-captions. This can (again) be solved by using the optional arguments of `\captionbox`, giving both boxes the same width, for example:

```
...
\subcaptionbox{A cat\label{cat}}
[.4\linewidth]{\includegraphics{cat}}%
\subcaptionbox{An elephant\label{elephant}}
[.4\linewidth]{\includegraphics{elephant}}
...
```

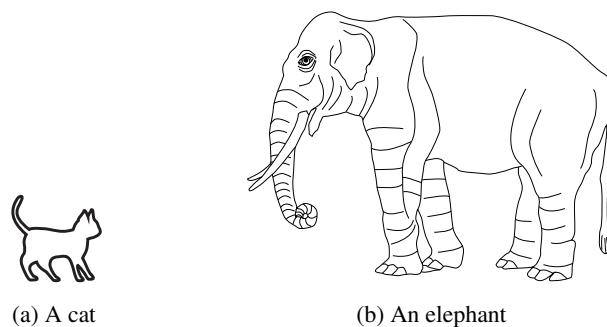


Figure 4: Two animals



The `\subcaptionbox` is a `\parbox` with `\captionsetup{subtype}` as first contents line.

1.4 The `\subref` command

While `\ref{<key>}` (and `\ref*{<key>}`, if the `hyperref` package is used) usually gives a combined result representing the main caption counter and the sub-caption one, it is sometimes useful to have a reference to the sub-caption only. For this purpose you can use

```
\subref{<key>}  
\subref*{<key>}3 .
```

So for example `\ref{cat}` gives the result ‘2a’ but `\subref{cat}` gives ‘a’.

Note: If the sub-caption was defined with the starred variant `\DeclareCaptionSubType*`, both `\ref` and `\subref` gives the same result.



The `\subref` command demonstrates the usage of `\caption@subtypehook` which will be called during `\captionsetup{subtype}`.

1.5 The `\DeclareCaptionSubType` command

`\DeclareCaptionSubType` For using the sub-caption feature of the caption package some commands and counters must be prepared. This is done with⁴

```
\DeclareCaptionSubType[<numbering scheme>]{<type>}  
\DeclareCaptionSubType*[<numbering scheme>]{<type>}
```

For the environments `figure` & `table` (and all the ones defined with `\DeclareCaptionType`) this will be done automatically by this package, but for others (e.g. defined with `\newfloat` offered by the `float` package or `\DeclareNewFloatType` offered by the `floatrow` package) this has to be done manually.

The starred variant provides the sub-caption numbering format `<type> . <subtype>` (e.g. ‘1.2’) while the non-starred variant simply uses `<subtype>` (e.g. ‘a’).

Own numbering formats can be created by redefining `\thesub<type>`, e.g.

```
\DeclareCaptionSubType*{figure}  
\renewcommand\thesubfigure{\thefigure\alph{subfigure}}
```

would give you sub-caption numbers like ‘1b’.

The default numbering scheme is `alph`, but you can use any \LaTeX command name here which converts a counter to a text value, e.g. `arabic`, `roman`, `Roman`, `alph`, `Alph`, `fnsymbol`, ...

But `\DeclareCaptionSubType` is not for defining new sub-caption types only, you can use this command for re-definitions as well, e.g.

```
\DeclareCaptionSubType*[arabic]{table}  
\captionsetup[subtable]{labelformat=simple,labelsep=colon}
```

³Like `\ref*`, `\subref*` is only available if the `hyperref` package^[3] is used.

⁴`\newsfloat` offered by the `subfig` package^[5] could be used for this purpose as well.

will give you sub-captions in tables like these ones:

Table 1: Two tables					
1.1: Table one			1.2: Table two		
A	B		E	F	
C	D		G	H	



`\DeclareCaptionSubType` is an integral part of the caption package kernel.

1.6 Where do hyperlinks jump?

For the `subfigure` & `subtable` environments and `\subcaptionbox` boxes (and own constructs which use `\captionsetup{subtype}`) the hyperlink anchors will be placed in respect to the `hycap=` setting. While usage of this option is straight-forward ordinary captions, the usage for sub-captions depends on the setting for the main captions. This table gives you an overview where the hyperlinks will jump:

caption subcaption	hycap=false	hycap=true
hycap=false	sub-caption	figure or table (<i>default setting</i>)
hycap=true	sub-figure or sub-table	sub-figure or sub-table

But if `\subcaption` is used and `hycap=true` is set for sub-captions, the `subcaption` package does not know where the sub-figure or sub-table actually begins, so it will jump to the sub-caption instead.

Remember: If you use the `hycap` package^[4], it controls the placement of the hyperlink anchors, making the rules above invalid.

(See also the documentation of the caption package, sections about `hyperref` & `hycap`.)

2 Beyond this package

For a more advanced usage of the sub-caption feature of the caption package, please take a look at the `floatrow` package^[2] which provides the powerful `subfloatrow` environment for typesetting sub-figures.

3 Thanks

I would like to thank Stephen Dalton who helped to make this package a better one.

4 The implementation

4.1 Identification

```
1 \NeedsTeXFormat{LaTeX2e}[1994/12/01]
2 \ProvidesPackage{subcaption}[2007/12/06 v0.3 Adding subcaptions (AR)]
```

4.2 Initial code

We need the caption package, so we issue an error here if it's not loaded yet.

```
3 \@ifundefined{caption@subtypehook}{% we need caption v3.1f or newer
4   \PackageError{subcaption}{`caption' package not loaded\MessageBreak
5     (which is needed by this package)\@gobble}{%
6     If you do not understand this error, please take a closer look\MessageBreak
7     at the documentation of the `subcaption' package.\MessageBreak
8   \@ehc}%
9   \endinput}{}
```

4.3 Execution of options

We map `\caption@setkeys` to `\captionsetup[sub]` so `\caption@ExecuteOptions` & `\caption@ProcessOptions` adds the options to the 'sub' option list instead of executing them immediately.

```
10 \let\caption@setkeys@ORI\caption@setkeys
11 \renewcommand\caption@setkeys[2]{\captionsetup[sub]{#2}}

12 \caption@ExecuteOptions{subcaption}{%
13   font+=small,labelformat=parens,labelsep=space,skip=6pt,list=0,hypcap=0}
14 \caption@ProcessOptions*{subcaption}

15 \let\caption@setkeys\caption@setkeys@ORI
16 \let\caption@setkeys@ORI\@undefined
```

4.4 Main code

We call `\DeclareCaptionSubType` for figure, table, and every caption type declared with `\DeclareCaptionType` here.

```
17 \@ifundefined{c@figure}{}{\DeclareCaptionSubType{figure}}
18 \@ifundefined{c@table}{}{\DeclareCaptionSubType{table}}
19 \caption@For{typelist}{\DeclareCaptionSubType{#1}}
```

4.4.1 The `\subcaption` command

`\subcaption` Without a prefacing `\captionsetup{subtype}`, `\subcaption` is some kind of `\captionof{sub\@captive}`.

Note: Like `\captionof`, this command is designed to be used inside an own group!

```
20 \newcommand*\subcaption{\captionsetup{subtype*}\caption}
```

But with a prefacing `\captionsetup{subtype}`, `\subcaption` is simply `\caption`.

```
21 \g@addto@macro\caption@subtypehook{\let\subcaption\caption}
```

4.4.2 The subfigure & subtable environments

`subfigure` This is just an ordinary minipage environment with `\captionsetup{subtype}` as first contents line. It will be defined using the helper macro `\caption@For{subtypelist}` offered by the caption kernel, so for every caption type declared with `\DeclareCaptionType` a corresponding ‘sub’ environment will be defined automatically.

`subtable`

```
22 \caption@For{subtypelist}{%
23   \newenvironment{sub#1}{%
24     {\caption@withoptargs\subcaption@minipage}%
25     {\endminipage}}%

26 \newcommand*\subcaption@minipage[2]{%
27   \minipage#1{#2}%
28   \captionsetup{subtype}}
```

4.4.3 The \subcaptionbox command

`\subcaptionbox` A `\parbox` with contents and sub-caption, separated by an invisible `\hrule`.

```
29 \newcommand*\subcaptionbox{\caption@withoptargs\subcaption@box}

30 \newcommand\subcaption@box[2]{%
31   \@testopt{\subcaption@ibox{#1}{#2}}{\wd\@tempboxa}}

32 \long\def\subcaption@ibox#1#2[#3]{%
33   \@testopt{\subcaption@iibox{#1}{#2}{#3}}\subcaptionbox@hj@default}

34 \long\def\subcaption@iibox#1#2#3[#4]#5{%
35   \setbox\@tempboxa\hbox{#5}%
36   \begingroup
37     \captionsetup{subtype*}% set \caption@position
38     \caption@iftop{%
39       \endgroup
40       \parbox[t]{#3}{%
41         \captionsetup{subtype,position=t}%
42         \vbox{\caption#1{#2}}%
43         \hrule\@height\z@
44         \csname caption@hj@#4\endcsname
45         \unhbox\@tempboxa}%
46       }{%
47         \endgroup
48         \parbox[b]{#3}{%
49           \captionsetup{subtype,position=b}%
50           \csname caption@hj@#4\endcsname
51           \unhbox\@tempboxa
52           \hrule\@height\z@
53           \vtop{\caption#1{#2}}}%
54     }}

55 \providecommand*\caption@hj@c{\centering}
56 \providecommand*\caption@hj@l{\raggedright}
57 \providecommand*\caption@hj@r{\raggedleft}
58 \providecommand*\caption@hj@s{}
59 \newcommand*\subcaptionbox@hj@default{c}
```

4.4.4 The `\subref` command

At `\captionsetup{subtype}`, we redefine `\label`.

```
60 \g@addto@macro\caption@subtyperhook{%
61   \ifx\label\subcaption@label \else
62     \let\subcaption@ORI@label\label
63     \let\label\subcaption@label
64   \fi}
```

`\subcaption@label` When a label will be placed for a sub-caption, we automatically place a second one for `\subref`, too. This second label will contain the sub-type counter only.

```
65 \newcommand*\subcaption@label[1]{%
66   \@bsphack\beginngroup
67     \subcaption@ORI@label{#1}%
68     \protected@edef\@currentlabel{\csname thesub\@capttype\endcsname}%
69     \subcaption@ORI@label{sub@#1}%
70   \endgroup\@esphack}
```

`\subref` This simply calls `\ref` with the second label. (see `\subcaption@label`)

```
71 \DeclareRobustCommand*\subref{\caption@withoptargs\subcaption@ref}
72 \newcommand*\subcaption@ref[2]{\ref#1{sub@#2}}
```

References

- [1] Frank Mittelbach and Michel Goossens:
The L^AT_EX Companion (2nd. Ed.), Addison-Wesley, 2004.
- [2] Olga Lapko:
The floatrow package documentation, 2007/12/24
- [3] Sebastian Rahtz & Heiko Oberdiek:
Hypertext marks in L^AT_EX, November 12, 2007
- [4] Heiko Oberdiek:
The hycap package – Adjusting anchors of captions, 2007/04/09
- [5] Steven D. Cochran:
The subfig package, 2005/07/05