

The **subfloat** package*

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Abstract

This package enables subnumbering of floats (figures and tables) similar to the subequations environment of the amsmath package. It does not the same as the subfigure package which generates subfigures within one normal figure.

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1 Introduction

Sometimes two or more floats (figures or tables) belong together in a way you should not use different caption numbers for them. With a subnumbering like that of the amsmath package for equations it is possible to point out the connection of the floats. This package provides two environments and four macros to achieve subnumbering of floats. It is possible to change the caption labels.

In case of problems or bugs please send an email to my address printed on the title page.

2 The user interface

To use this package place

```
\usepackage{subfloat}
```

in the preamble of your document. No options are necessary.

If you want to be able to count the number of subfloats with the same main number you have to add the package option `countmax`:

```
\usepackage[countmax]{subfloat}
```

For more description to counting see section 5.

2.1 Environments

`subfigures` Put

```
\begin{subfigures}
\end{subfigures}
```

`subtables` around the figures which belong together. By default, they get the same figure number with an increasing lowercase character added. In the same way you can put

```
\begin{subtables}
\end{subtables}
```

around tables. The macros for the environments have to be placed outside the picture or table environments.

2.2 Macros

```
\subfiguresbegin
\subfiguresend
\subfiguresbegin
\subfiguresend
```

Instead using of the environments it is possible to use adequate macros:

fig. 1

Figure 1a: This is the first figure

fig. 2

Figure 1b: This is the second figure

```
\subtablesbegin or  
\subtablesend  
  \subtablesbegin  
  \subtablesend
```

Put these macros in place of the environment macros. The macros are necessary to be able to nest subnumbered figures and tables.

If you put labels inside the figure and table environments the subfloat label numbers are referenced. If you want a reference to the common figure or table number place a label right after the `\begin{subfigures}`, `\subfiguresbegin`, `\begin{subtables}`, or `\subtablesbegin` command.

3 Examples

3.1 Using the environments

subfigures The code

```
\begin{subfigures}  
  \label{fig:fig1a2}  
  %  
  \begin{figure}\centering  
    \fbox{fig. 1}  
    \caption{This is the first figure}\label{fig:fig1}  
  \end{figure}  
  %  
  \begin{figure}\centering  
    \fbox{fig. 2}  
    \caption{This is the second figure}\label{fig:fig2}  
  \end{figure}  
  %  
\end{subfigures}
```

produces the output of the figures 1 (figure 1a and figure 1b). References are made as usual with e.g. `\ref{fig:fig1}`.

subtables The output of the tables 1a and 1a is generated similarly:

```
\begin{subtables}  
  %  
  \begin{table}\centering  
    \caption{This is the first table}\label{tab:tab1}  
    \begin{tabular}{l} \hline  
    table 1\\ \hline
```

Table 1a: This is the first table

table 1

Table 1b: This is the second table

table 2

[fig. 3]

Figure 2a: This is the third figure

```
\end{tabular}
\end{table}
%
\begin{table}\centering
\caption{This is the second table}\label{tab:tab2}
\begin{tabular}{l} \hline
table 2 \\ \hline
\end{tabular}
\end{table}
%
\end{subtables}
```

The environment names `subfigures` and `subtables` were chosen to be similar to the `subequations` environment of the amsmath package. But what is to do when both environments have to be nested? This case is handled in the next section.

3.2 Using the macros

```
\subfiguresbegin
\subfiguresend
\subtablesbegin
\subtablesend
\subfiguresbegin
\begin{figure}
[...]
\begin{table}
[...]
\subtablesbegin
\begin{table}
[...]
\begin{figure}
[...]
\subfiguresend
\begin{figure}
[...]
\begin{table}
[...]
\subtablesend
```

Table 2: This is the third table

table 3

Table 3a: This is the forth table

table 4

[fig. 4]

Figure 2b: This is the forth figure

[fig. 5]

Figure 3: This is the fifth figure

Table 3b: This is the fifth table

table 5

With these macros it is possible to realise nested subnumbers of figures and tables. Even nested subnumbers of figures or tables and equations made with the subequations environment of the amsmath package are possible.

4 Change the label format

The standard label format is the global float number followed by a lowercase alphanumeric subfloat number. This can be changed by redefining the commands `\thesubfloatfigure` and `\thesubfloattable`. Both define the whole float number including the main number. The main number is referred by `\themainfigure` resp. `\themaintable`. The counters of the subfloats are `subfloatfigure` resp. `subfloattable`. The default values are:

```
\newcommand*\thesubfloatfigure{\themainfigure\alph{subfloatfigure}}
\newcommand*\thesubfloattable{\themaintable\alph{subfloattable}}
```

If you want to print the subnumber of figures in brackets, you may define this:

```
\renewcommand*\thesubfloatfigure{\themainfigure(\alph{subfloatfigure})}
```

If you want a sublabel in the format 1–1, 1–2, … you can get it by the following command sequence:

```
\renewcommand*\thesubfloatfigure{\themainfigure--\arabic{subfloatfigure}}
```

Since it is done the same for tables this it not described again.

5 Count subfloats

If the package option `countmax` is used the package counts the number of all subfloats with the same main float number. This number is stored in the counters `subfloatfiguremax` resp. `subfloattablemax` and can be used for changeing the labels, e.g.:

```
\renewcommand*\thesubfloatfigure{%
  \themainfigure(\arabic{subfloatfigure}/\arabic{subfloatfiguremax})}
```

If the package option is not set but `subfloatfiguremax` used an error messages is produced by L^AT_EX. Normally there should be an error message of the following types:

```
! Missing number, treated as zero.
<to be read again>
          \c@subfloatfiguremax
1.64      }

?
```

or

```
! Undefined control sequence.
<write> ...abel{ressim2}{{I(b/\c@subfloattablemax
                                )}\{\thepage }{Estimation o...
1.105 \end{document}

?
```

There may be `\c@subfloatfiguremax` or `\c@subfloattablemax`. In a former version, `subfloat` has generated a nice error message. But unfortunately this code has been incompatible to `tabularx`.

In order to get the numbers right L^AT_EX has to be run twice or three times.¹

6 Command reference

This sections gives a short list of the main commands and environments of this package.

environment	description
<code>subfigures</code>	Increases the figure number by one and starts subnumbering by appending a, b, c, ... to the fixed figure number
<code>subtables</code>	Increases the table number by one and starts subnumbering by appending a, b, c, ... to the fixed table number

¹Internally, this is implemented using labels. After the first L^AT_EX run, the counter is zero end thus not displayed for alpha or roman numbering.

macro	description
\subfiguresbegin	Increases the figure number by one and starts subnumbering by appending a, b, c, ... to the fixed figure number
\subfiguresend	Returns to ordinary figure numbering
\subtablesbegin	Increases the table number by one and starts subnumbering by appending a, b, c, ... to the fixed table number
\subtablesend	Returns to ordinary table numbering
\thesubfloatfigure	Defines the output format of the main and subfigure number.
\themainfigure	Number of the main figure
\thesubfloattable	Defines the output format of the main and subtable number.
\themaintable	Number of the main table

To do

At the moment, I don't know anything.

Acknowledgements

Thanks to Frank Mittelbach who had the idea to make the label changeable. Furthermore, he helped to develop a user friendly interface to do this.

7 The implementation

Heading of the package:

```

1 \NeedsTeXFormat{LaTeX2e}
2 \ProvidesPackage{subfloat}
3           [\filedate\space version \fileversion]
4 \message{Package `subfloat', Version \fileversion\space of \filedate.}

5 \newif\ifsubfloat@countmax

```

Option to count the floats.

```

6 \DeclareOption{countmax}{\subfloat@countmaxtrue}
7 \DeclareOption{nocountmax}{\subfloat@countmaxfalse}%
8 \ExecuteOptions{nocountmax}
9 \ProcessOptions\relax

```

7.2 Figures

\thesubfloatfigure Defining the output format of captions:

```
10 \newcommand*\thesubfloatfigure{\themainfigure\alph{subfloatfigure}}
```

subfigures Defining the environment **subfigures**:

```
11 \newenvironment{subfigures}{%
```

Call start command for subnumbering:

```
12 \subfiguresbegin
13 }{%
```

Call end command for subnumbering:

```
14 \subfiguresend
15 \global\@ignoretrue
16 }
```

Make a copy of `\c@figure` in `\c@subfloatfigure` in order to be able to use the counter `subfloatfigure` in the defintion of `\thesubfloatfigure`:

```
17 \let\c@subfloatfigure=\c@figure
```

Define the boolean `\ifinsubfloatfigures` to determine if we are inside a subfloatfigures area:

```
18 \newif\ifinsubfloatfigures
```

`\thefiguresbegin` Defining the macro `\thefiguresbegin`:

```
19 \newcommand{\subfiguresbegin}{%
```

Check if `\subfiguresbegin` may be called here:

```
20 \ifinsubfloatfigures
21 \PackageError{subfloat}{Cannot start subfloatfigures inside
22 a\MessageBreak subfloatfigure area}{You probably have used
23 \string\subfiguresbegin\space or \string\begin{subfigures} inside
24 the^^Jsame environment or after \string\subfiguresbegin.}%
25 \fi
```

Set testing boolean to true:

```
26 \global\insubfloatfigurestrue
```

Increase figure number:

```
27 \refstepcounter{figure}%
```

Save value of counter `figure`:

```
28 \protected@xdef\figure@value{\the\c@figure}%
```

Save counter `figure` in printed format:

```
29 \protected@xdef\themainfigure{\thefigure}%
```

Save the original macro `\thefigure`:

```
30 \global\let\thefigure@original=\thefigure
```

Reset counter `figure` to zero. It functions as subfloat counter until `\subfiguresend`.

```
31 \setcounter{figure}{0}%
```

Redefine macro `\thefigure` to use subnumbering:

```
32 \gdef\thefigure{\thesubfloatfigure}%
```

Set counter to maximal number of subfloatfigures. Therefore local redefinition of `\@setref` in order to change the warning and to set the counter `subfloatfiguremax` correct. Thereafter call `\@setref` using the `\ref` command:

```
33 \ifsubfloat@countmax
34   \def\@setref##1##2##3{%
35     \ifx##1\relax
36       \protect\G@refundefinedtrue
```

```

37      \setcounter{subfloatfiguremax}{0}%
38      \PackageWarningNoLine{subfloat}{Reference `##3' on page
39          \thepage \space undefined\MessageBreak
40          (count subfloatfigures)}%
41      \else
42          \setcounter{subfloatfiguremax}{\expandafter\@firstoftwo##1}%
43      \fi}%
44      \ref{subfloat@@figure\figure@value}}%
45  \fi

```

Redefine the macro `\p@subfigure` (from `subfigure.sty`) in order to generate correct labels for subfigures:

```

46 %%  \@ifpackageloaded{subfigure}{%
47     \let\p@subfigure=\thesubfloatfigure
48 %% }{}%

```

Ignore spaces:

```

49 \ignorespaces
50 }

```

`\thefiguresend` Defining the macro `\thefiguresend`:

```
51 \newcommand{\subfiguresend}{%
```

Check if `\subfiguresend` may be called here:

```

52 \ifinsubfloatfigures
53 \else
54     \PackageError{subfloat}{Cannot stop subfloatfigures outside
55         a\MessageBreak subfloatfigure area}{You probably have used
56         \string\subfiguresend\space or \string\end{subfigures} without
57         starting a^Jsubfloatfigure area using the same environment or
58         \string\subfiguresbegin.}%
59 \fi

```

Set testing boolean to false:

```
60 \global\insubfloatfiguresfalse
```

Write the number of subfloatfigures into the aux file:

```

61 \ifsubfloat@countmax
62     \subfloat@figurelabel{subfloat@@figure\figure@value}%
63 \fi

```

Set counter `figure` back to original value:

```
64 \setcounter{figure}{\figure@value}%
```

Restore the original macro `\thefigure`:

```
65 \global\let\thefigure=\thefigure@original
```

Restore the original macro `\p@subfigure` (from `subfigure.sty`):

```

66 %%  \@ifpackageloaded{subfigure}{%
67     \let\p@subfigure=\thefigure
68 %% }{}%

```

Ignore spaces:

```

69 \ignorespaces
70 }
71 %%

```

Introduce the counter for the number of subfloatfigures. If both the option `countmax` is not used and this counter is tried to be used, an not understandable error message is generated (e.g. “! Missing number, treated as zero”. There has been code that produced a nice error message, but it was incompatible to tabularx (namely the command `\cl@ckpt`).

```

72 \ifsubfloat@countmax
73   \newcounter{subfloatfiguremax}
74 \else
Warning if countmax is off.
75   \PackageWarningNoLine{subfloat}{Numbers of floats not
76     counted:\MessageBreak
77     If you use one of the counters subfloatfiguremax or\MessageBreak
78     subfloattablemax you will get strange error messages\MessageBreak
79     containing \string\c@subfloatfiguremax\space or\MessageBreak
80     \string\c@subfloattablemax:\MessageBreak
81     Please switch on countmax or
82     remove the code using\MessageBreak
83     the counter then.}
84 \fi

```

`\subfloat@figurelabel` This command makes a label for the current figure, always with an arabic number:

```

85 \ifsubfloat@countmax
86   \newcommand*\subfloat@figurelabel[1]{\@bsphack
87     \protected@write\@auxout{}{%
88       \string\newlabel{\#1}{{\the\c@figure}{\thepage}}%
89     }\@esphack}
90 \fi

```

7.3 Tables

`\thesubfloattable` Defining the output format of captions:

```
91 \newcommand*\thesubfloattable{\themaintable\alph{subfloattable}}
```

`subtables` Defining the environment `subtables`:

```
92 \newenvironment{subtables}{%
```

Call start command for subnumbering:

```
93 \subtablesbegin
94 }{%
```

Call end command for subnumbering:

```
95 \subtablesend
96 \global\ignoretrue
97 }
```

Make a copy of `\c@table` in `\c@subfloattable` in order to be able to use the counter `subfloattable` in the defintion of `\thesubfloattable`:

```
98 \let\c@subfloattable=\c@table
```

Define the boolean `\ifinsubfloattables` to determine if we are inside a subfloat-tables area:

```
99 \newif\ifinsubfloattables
```

```

\thetablesbegin Defining the macro \thetablesbegin:
100 \newcommand{\subtablesbegin}{%
Check if \subtablesbegin may be called here:
101 \ifinsubfloatables
102   \PackageError{subfloat}{Cannot start subfloatables inside
103     a\MessageBreak subfloatfigure area}{You probably have used
104     \string\subtablesbegin\space or \string\begin{subtables} inside
105     the^Jsame environment or after \string\subtablesbegin.}%
106 \fi
Set testing boolean to true:
107 \global\insubfloattablestrue
Increase table number:
108 \refstepcounter{table}%
Save value of counter table:
109 \protected@xdef\table@value{\the\c@table}%
Save counter table in printed format:
110 \protected@xdef\themaintable{\thetable}%
Save the original macro \thetable:
111 \global\let\thetable@original=\thetable
Reset counter table to zero. It functions as subfloat counter until \subtablesend.
112 \setcounter{table}{0}%
Redefine macro \thetable to use subnumbering:
113 \gdef\thetable{\thesubfloattable}%
Set counter to maximal number of subfloatables. Therefore local redefinition of
\@setref in order to change the warning and to set the counter subfloattablemax
correct. Thereafter call \@setref using the \ref command:
114 \ifsubfloat@countmax
115   {\def\@setref##1##2##3{%
116     \ifx##1\relax
117       \protect\G@refundefinedtrue
118       \setcounter{subfloattablemax}{0}%
119       \PackageWarningNoLine{subfloat}{Reference '##3' on page
120         \thepage \space undefined\MessageBreak
121         (count subfloatables)}%
122     \else
123       \setcounter{subfloattablemax}{\expandafter\@firstoftwo##1}%
124     \fi}%
125   \ref{subfloat@@table\table@value}}%
126 \fi
Redefine the macro \p@subtable (from subfigure.sty) in order to generate correct
labels for subtables:
127 %% \@ifpackageloaded{subfigure}{%
128   \let\p@subtable=\thesubfloattable
129 %% }{}%
Ignore spaces:
130 \ignorespaces
131 }

```

```

\subtablesend Defining the macro \thetableend:
132 \newcommand{\subtableend}{%
Check if \subtableend may be called here:
133 \ifinsubfloattables
134 \else
135   \PackageError{subfloat}{Cannot stop subfloattables outside
136     a\MessageBreak subfloatfigure area}{You probably have used
137     \string\subtableend\space or \string\end{subtables} without
138     starting a^~Jsubfloatfigure area using the same environment or
139     \string\subtablesbegin.}%
140 \fi
Set testing boolean to false:
141 \global\insubfloattablesfalse
Write the number of subfloattables into the aux file:
142 \ifsubfloat@countmax
143   \subfloat@tablelabel{\subfloat@@table\table@value}%
144 \fi
Set counter table back to original value:
145 \setcounter{table}{\table@value}%
Restore the original macro \thetable:
146 \global\let\thetable=\thetable@original
Restore the original macro \p@subtable (from subfigure.sty):
147 %% \ifpackageloaded{subfigure}%
148 \let\p@subtable=\thetable
149 %% }{}%
Ignore spaces:
150 \ignorespaces
151 }
152 %%

```

Introduce the counter for the number of subfloattables. If both the option `countmax` is not used and this counter is tried to be used, an not understandable error message is generated (e.g. “! Missing number, treated as zero”. There has been code that produced a nice error message, but it was incompatible to tabularx (namely the command `\cl@ckpt`).

```

153 \ifsubfloat@countmax
154   \newcounter{subfloattablemax}
155 %\else
156 % \newcounter{subfloattablemax}
157 % \let\orig@c@subfloattablemax=\c@subfloattablemax
158 % \def\c@subfloattablemax{\orig@c@subfloattablemax
159 %   \PackageError{subfloat}{Counter subfloattablemax used
160 %     without\MessageBreak
161 %     package option countmax}{The counter subfloattablemax may
162 %     only be used with the package option\MessageBreak
163 %     countmax. Normally this error happens when
164 %     \string\thesubfloattable\space is redefined.}%
165 \fi

```

`\subfloat@tablelabel` This command makes a label for the current table, always with an arabic number:

```

166 \ifsubfloat@countmax
167   \newcommand*\subfloat@tablelabel[1]{\@bsphack
168     \protected@write\@auxout{%
169       {\string\newlabel{#1}{{\the\c@table}{\thepage}}}}
170   \@esphack}
171 \fi

```

The end of the package:

```
172 \endinput
```

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