# 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.

## Contents



## Copyright



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

```
\subfiguresbegin
\subfiguresend
```


Figure 1a: This is the first figure


Figure 1b: This is the second figure

`\subtablesbegin` `\subtablesend` or

```
\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 numberes 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 |
|---|


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`

The usage of the macros is shown in the example below:

```
\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 |
|---|


Figure 2b: This is the forth figure


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 alphanumerical 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 LaTeX. Normally there should be an error message of the following types:

```
! Missing number, treated as zero.
<to be read again>
                   \c@subfloatfiguremax
l.64        }

?
```

or

```
! Undefined control sequence.
<write> ...abel{ressim2}{{I(b/\c@subfloattablemax
                                                )}{\thepage }{Estimation o...
l.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 LaTeX 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 |
|---|---|
| `subfigures` | Increases the figure number by one and starts subnumbering by appending a, b, c, ... to the fixed figure number |
| `subtables` | Increases the table number by one and starts subnumbering by appending a, b, c, ... to the fixed table number |

[1] Internally, this is implemented using labels. After the first LaTeX 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:

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

## 7.1 Options

```
\newif\ifsubfloat@countmax
```

Option to count the floats.

```
\DeclareOption{countmax}{\subfloat@countmaxtrue}
\DeclareOption{nocountmax}{\subfloat@countmaxfalse}%
\ExecuteOptions{nocountmax}
\ProcessOptions\relax
```

## 7.2 Figures

\thesubfloatfigure Defining the output format of captions:

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

subfigures Defining the environment subfigures:

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

Call start command for subnumbering:

```
  \subfiguresbegin
}{%
```

Call end command for subnumbering:

```
  \subfiguresend
  \global\@ignoretrue
}
```

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

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

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

```
\newif\ifinsubfloatfigures
```

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

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

Check if `\subfiguresbegin` may be called here:

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

Set testing boolean to true:

```
\global\insubfloatfigurestrue
```

Increase figure number:

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

Save value of counter `figure`:

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

Save counter `figure` in printed format:

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

Save the original macro `\thefigure`:

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

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

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

Redefine macro `\thefigure` to use subnumbering:

```
  \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:

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

```
        \setcounter{subfloatfiguremax}{0}%
        \PackageWarningNoLine{subfloat}{Reference `##3' on page
          \thepage \space undefined\MessageBreak
          (count subfloatfigures)}%
      \else
        \setcounter{subfloatfiguremax}{\expandafter\@firstoftwo##1}%
      \fi}%
    \ref{subfloat@@figure\figure@value}}%
  \fi
```

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

```
%%  \@ifpackageloaded{subfigure}{%
    \let\p@subfigure=\thesubfloatfigure
%%  }{}%
```

Ignore spaces:

```
  \ignorespaces
}
```

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

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

Check if `\subfiguresend` may be called here:

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

Set testing boolean to false:

```
\global\insubfloatfiguresfalse
```

Write the number of subfloatfigures into the `aux` file:

```
  \ifsubfloat@countmax
    \subfloat@figurelabel{subfloat@@figure\figure@value}%
  \fi
```

Set counter `figure` back to original value:

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

Restore the original macro `\thefigure`:

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

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

```
%%  \@ifpackageloaded{subfigure}{%
    \let\p@subfigure=\thefigure
%%  }{}%
```

Ignore spaces:

```
  \ignorespaces
}
%%
```

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`).

```
\ifsubfloat@countmax
  \newcounter{subfloatfiguremax}
\else
```

Warning if countmax is off.

```
  \PackageWarningNoLine{subfloat}{Numbers of floats not
    counted:\MessageBreak
    If you use one of the counters subfloatfiguremax or\MessageBreak
    subfloattablemax you will get strange error messages\MessageBreak
    containing \string\c@subfloatfiguremax\space or\MessageBreak
    \string\c@subfloattablemax:\MessageBreak
    Please switch on countmax or
    remove the code using\MessageBreak
    the counter then.}
\fi
```

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

```
\ifsubfloat@countmax
  \newcommand*\subfloat@figurelabel[1]{\@bsphack
    \protected@write\@auxout{}%
           {\string\newlabel{#1}{{\the\c@figure}{\thepage}}}%
    \@esphack}
\fi
```

## 7.3 Tables

`\thesubfloattable` Defining the output format of captions:

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

`subtables` Defining the environment `subtables`:

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

Call start command for subnumbering:

```
  \subtablesbegin
}{%
```

Call end command for subnumbering:

```
  \subtablesend
  \global\@ignoretrue
}
```

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

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

Define the boolean `\ifinsubfloattables` to determine if we are inside a subfloattables area:

```
\newif\ifinsubfloattables
```

\thetablesbegin Defining the macro \thetablesbegin:

```
\newcommand{\subtablesbegin}{%
```

Check if \subtablesbegin may be called here:

```
\ifinsubfloattables
  \PackageError{subfloat}{Cannot start subfloattables inside
    a\MessageBreak subfloatfigure area}{You probably have used
    \string\subtablesbegin\space or \string\begin{subtables} inside
      the^^Jsame environment or after \string\subtablesbegin.}%
\fi
```

Set testing boolean to true:

```
\global\insubfloattablestrue
```

Increase table number:

```
  \refstepcounter{table}%
```

Save value of counter table:

```
  \protected@xdef\table@value{\the\c@table}%
```

Save counter table in printed format:

```
  \protected@xdef\themaintable{\thetable}%
```

Save the original macro \thetable:

```
  \global\let\thetable@original=\thetable
```

Reset counter table to zero. It functions as subfloat counter until \subtablesend.

```
  \setcounter{table}{0}%
```

Redefine macro \thetable to use subnumbering:

```
  \gdef\thetable{\thesubfloattable}%
```

Set counter to maximal number of subfloattables. 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:

```
  \ifsubfloat@countmax
    {\def\@setref##1##2##3{%
      \ifx##1\relax
        \protect\G@refundefinedtrue
        \setcounter{subfloattablemax}{0}%
        \PackageWarningNoLine{subfloat}{Reference `##3' on page
          \thepage \space undefined\MessageBreak
          (count subfloattables)}%
      \else
        \setcounter{subfloattablemax}{\expandafter\@firstoftwo##1}%
      \fi}%
    \ref{subfloat@@table\table@value}}%
  \fi
```

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

```
%%  \@ifpackageloaded{subfigure}{%
    \let\p@subtable=\thesubfloattable
%%  }{}%
```

Ignore spaces:

```
  \ignorespaces
}
```

\subtablesend Defining the macro \thetablesend:

```
\newcommand{\subtablesend}{%
```

Check if \subtablesend may be called here:

```
\ifinsubfloattables
\else
  \PackageError{subfloat}{Cannot stop subfloattables outside
    a\MessageBreak subfloatfigure area}{You probably have used
    \string\subtablesend\space or \string\end{subtables} without
      starting a^^Jsubfloatfigure area using the same environment or
      \string\subtablesbegin.}%
\fi
```

Set testing boolean to false:

```
\global\insubfloattablesfalse
```

Write the number of subfloattables into the aux file:

```
  \ifsubfloat@countmax
    \subfloat@tablelabel{subfloat@@table\table@value}%
  \fi
```

Set counter table back to original value:

```
  \setcounter{table}{\table@value}%
```

Restore the original macro \thetable:

```
  \global\let\thetable=\thetable@original
```

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

```
%%  \@ifpackageloaded{subfigure}{%
    \let\p@subtable=\thetable
%%  }{}%
```

Ignore spaces:

```
  \ignorespaces
}
%%
```

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).

```
\ifsubfloat@countmax
  \newcounter{subfloattablemax}
%\else
%  \newcounter{subfloattablemax}
%  \let\orig@c@subfloattablemax=\c@subfloattablemax
%  \def\c@subfloattablemax{\orig@c@subfloattablemax
%    \PackageError{subfloat}{Counter subfloattablemax used
%      without\MessageBreak
%      package option countmax}{The counter subfloattablemax may
%      only be used with the package option\MessageBreak
%      countmax. Normally this error happens when
%      \string\thesubfloattable\space is redefined.}}
\fi
```

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

```
\ifsubfloat@countmax
  \newcommand*\subfloat@tablelabel[1]{\@bsphack
    \protected@write\@auxout{}%
          {\string\newlabel{#1}{{\the\c@table}{\thepage}}}%
    \@esphack}
\fi
```

The end of the package:

```
\endinput
```

# Index

Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; numbers in roman refer to the code lines where the entry is used.

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