The figureSeries package*

Thomas Weise
Nature Inspired Computation and Applications Laboratory
USTC-Birmingham Joint Research Institute in Intelligent Computation and Its Applications
School of Computer Science and Technology (SCST)
University of Science and Technology of China (USTC)
West Campus, Science and Technology Building, West Wing, Room 601
Huangshan Road/Feixi Road, Hefei 230027, Anhui, China
tweise@ustc.edu.cn · tweise@gmx.de · http://www.it-weise.de/

July 13, 2015

Abstract

This package provides a first working version of a figure*-like construct, which can contain arbitrarily many sub-figures, (somewhat) float, and automatically break over multiple pages if necessary. The most current source code of this package can be found online at `http://github.com/thomasWeise/figureSeries`. Some discussions and additional information may be found at `http://www.it-weise.de`.

Contents

*This document corresponds to figureSeries v0.9.4, dated 2015/02/13.

1 Introduction

1.1 Addressed Problem and Use Case

LaTeX documents can contain floating objects such as figures or tables. "floating" here means that you insert a figure somewhere in your text and LaTeX will find the best place where to put it for you, a place where it fits nicely into the overall layout of the document. Sometimes it is desirable that a figure contains several sub-figures. Let's say you want to group several diagrams which show related information and which all have the same structure.

In LaTeX, a floating object (composed of its contents and potentially a caption) can occupy at most one full page, meaning that it cannot contain any page break. This, in turn, means that the number of (or better the space for) sub-figures that can be hosted inside a figure is limited as well. But what if we have too many sub-figures? What it the sub-figures do not fit on one page, into one floating object, into one `\begin{figure}...\end{figure}`? (Again: The required space includes the space for the sub-figures themselves, their captions, the vertical space between rows of sub-figures, and the caption of the hosting figure.)

We can somewhat solve this issue by splitting the hosting figure into several separate figures, each containing a feasible amount of sub-figures. This needs to be done by hand, because we need to compile the document and fix and compile and fix and so on, since we usually not know beforehand how many sub-figures fit into one figure. This is not nice.

Problems may occur when our LaTeX document is created automatically and has an *a priori* unknown number of sub-figures in a figure. There is no way to automatically determine how many sub-figures we can place into a figure. Even if we would know the sub-figure sizes, we cannot compute the space occupied by their captions beforehand (well, without replicating LaTeX, that is...). Trust me, I have tried this (in the software project *TSPSuite* [1]). Similar use cases have been reported in [2, 3].

Also, LaTeX is limited in terms of the number of floating objects it can handle, I believe the limit is 18 and can be increased using the package `morefloats` [4], but this is a true problem when creating many sub-figures automatically. You may have so many sub-figures that splitting them into multiple (hosting) figures leads to too many (hosting) figures. Or you just end up with too many floating objects which are all laid out at once at the end of a chapter or something or which otherwise make your text layout look odd and unbalanced.

1.2 Provided Functionality

This package provides

1. a facility to include an arbitrary number of (potentially differently-sized) sub-figures into a figure*-like construct,

2. the ability to make this figure*-like construct look as if it was a floating object, which

3. works well in both one-column and two-column documents.

2 Usage

2.1 Loading the Package

Load this package using

```
\RequirePackage{figureSeries}
```

This will automatically load the packages `caption` [5], `subcaption` [6], `afterpage` [7], and `cuted` [8].

2.2 Provided Macros

Here we discuss the macros that can directly be accessed by the user to make use of the package's functionality. The implementation of these macros is given in Section 3.2 and several examples can be found in Section 2.3.

`\figureSeriesElement` The macro `\figureSeriesElement{`⟨*caption*⟩`}{`⟨*contents*⟩`}` inserts an element of the figure series, i.e., one sub-figure. Its first argument is the caption of the element and may contain a `\label`. The second argument is the graphic to print. It could, e.g., be a call to `\includegraphic` from the `graphicx` package [9].

`\figureSeriesRow` `\figureSeriesElement{`⟨*contents*⟩`}` inserts a new row of elements (sub-figures) into the figure series. Its single argument should thus contain a sequence of `\figureSeriesElement`s. As a consequence of this architecture, each sub-figure belongs to one row and no sub-figure can span multiple rows.

`\figureSeriesHere` The macro `\figureSeriesHere{`⟨*caption*⟩`}{`⟨*contents*⟩`}` tries to insert a (non-floating) figure series at the current position in the document. This means that it may begin wherever, well, it is used, e.g., in the middle of the page.

The macro has two mandatory parameters, the caption and the contents. The caption will be be put at the beginning of the figure series, which is different from the normal behavior of captions in `\begin{figure*}...\end{figure*}` or `\begin{figure}...\end{figure}`. The reason is that a figure series may span over multiple pages and having the caption at the end may be awkward and confusing. The caption text may contain a `\label`.

The contents of a figure series should be a sequence of `\figureSeriesRow` calls.

Since figure series are page-wide elements, starting them in the middle of the page only works in one-column documents. In two-column documents, any figure series will behave as specified in macro `\figureSeriesFloat` below.

`\figureSeriesFloat` The macro `\figureSeriesFloat{`⟨*caption*⟩`}{`⟨*contents*⟩`}` macro takes the same parameters as `\figureSeriesHere`, but has a float-like behavior. By using the `\afterpage` command of `afterpage` package [7], we let it start at the following page. This is different from LaTeX' normal floating behavior, but as good as we can get with page-breaking objects, I think.

2.3 Examples

Here we provide a set of examples for the use of the package. Each example demonstrates another facet of the package and, at the same time, serves as test case. Instead of using `\includegraphic`, we simply stretch single letters via `\resizebox` and use them "sub-figures". This is good enough to see how the layout works and allows us to generate arbitrarily-sized placeholders for figures.

In order to create some placeholder text in the examples, we use the `lipsum` command from package `lipsum` [10], which prints pseudo-Latin text known as "Lorem Ipsum" (see `http://en.wikipedia.org/wiki/Lorem_ipsum`).

2.3.1 Non-Floating Figure Series in Single-Column Document

In Example 1 we place a non-floating figure series consisting of two rows of figures into a one-column document using Springer's document class `llncs` [11]. The result can be seen in Figure 1 and compared with a floating version in Figure 7, which represents the floating version of this example (given in Example 7).

Example 1 An example using the one-column `llncs` class, rendered as Figure 1.

```
\documentclass{llncs}%
\RequirePackage{graphicx}%
\RequirePackage{lipsum}%
\RequirePackage{figureSeries}%
\begin{document}%
\lipsum%
\figureSeriesHere{%
My first figure series should appear somewhere in the text.%
}{%
\figureSeriesRow{%
\figureSeriesElement{Caption 1.1}{\resizebox{0.3\linewidth}{5cm}{\fbox{a}}}%
\figureSeriesElement{Caption 1.2}{\resizebox{0.3\linewidth}{5cm}{\fbox{b}}}%
\figureSeriesElement{Caption 1.3}{\resizebox{0.3\linewidth}{5cm}{\fbox{c}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 1.4}{\resizebox{0.3\linewidth}{5cm}{\fbox{d}}}%
\figureSeriesElement{Caption 1.5}{\resizebox{0.3\linewidth}{5cm}{\fbox{e}}}%
\figureSeriesElement{Caption 1.6}{\resizebox{0.3\linewidth}{5cm}{\fbox{f}}}%
}}%
\lipsum%
\end{document}%
```

2.3.2 Floating Figure Series in Two-Column Document

We now put a floating figure series into a two-column document using the `IEEEtran` [12] class in Example 2. This new figure series has five rows of subfigures and should span over multiple pages. The two-column text continues directly after the figure series. The rendered results of this example are given in Figure 2.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

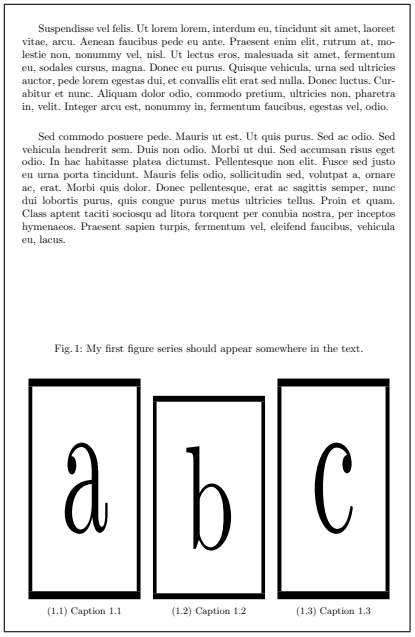
Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.

(1.1) Page 1 of the pdf compiled from Example 1.



Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

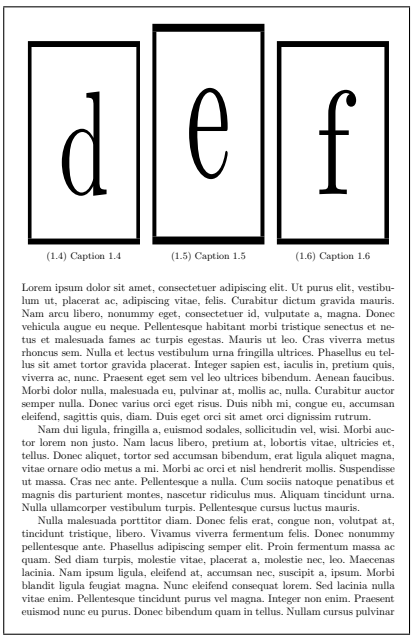
Sed commodo posuere pede. Mauris ut est. Ut quis purus. Sed ac odio. Sed vehicula hendrerit sem. Duis non odio. Morbi ut dui. Sed accumsan risus eget odio. In hac habitasse platea dictumst. Pellentesque non elit. Fusce sed justo eu urna porta tincidunt. Mauris felis odio, sollicitudin sed, volutpat a, ornare ac, erat. Morbi quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.

Fig. 1: My first figure series should appear somewhere in the text.

a b c

(1.1) Caption 1.1 (1.2) Caption 1.2 (1.3) Caption 1.3

(1.2) Page 2 of the pdf compiled from Example 1.



d e f

(1.4) Caption 1.4 (1.5) Caption 1.5 (1.6) Caption 1.6

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar

(1.3) Page 3 of the pdf compiled from Example 1.

lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.

Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

Sed commodo posuere pede. Mauris ut est. Ut quis purus. Sed ac odio. Sed vehicula hendrerit sem. Duis non odio. Morbi ut dui. Sed accumsan risus eget odio. In hac habitasse platea dictumst. Pellentesque non elit. Fusce sed justo eu urna porta tincidunt. Mauris felis odio, sollicitudin sed, volutpat a, ornare ac, erat. Morbi quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.

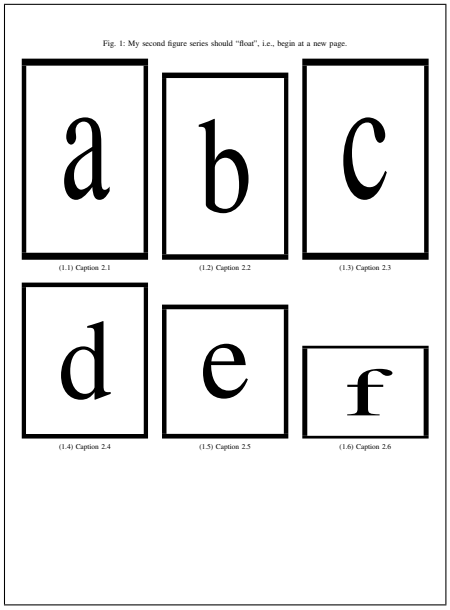
(1.4) Page 4 of the pdf compiled from Example 1.

Figure 1: The rendered result of Example 1 (with trimmed page margins): A `figureSeries` starts at the bottom of a page and extends to the top of the next page.

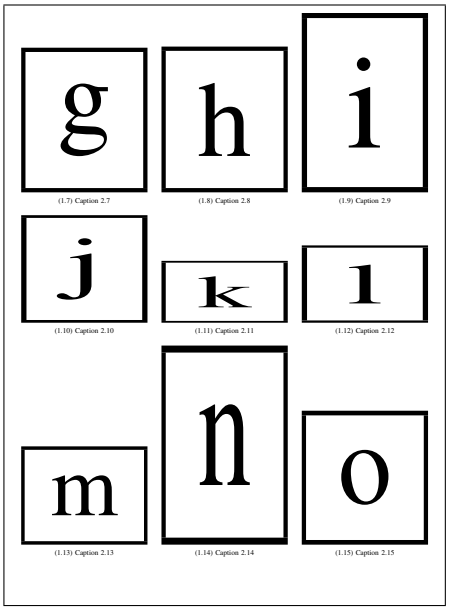
Example 2 An example using the two-column `IEEEtrans` class, rendered as Figure 2.

```
\documentclass{IEEEtran}%
\RequirePackage{graphicx}%
\RequirePackage{lipsum}%
\RequirePackage{figureSeries}%
\begin{document}%
\lipsum%
\figureSeriesFloat{%
My second figure series should ``float'', i.e., begin at a new page.%
}{%
\figureSeriesRow{%
\figureSeriesElement{Caption 2.1}{\resizebox{0.3\linewidth}{6cm}{\fbox{a}}}%
\figureSeriesElement{Caption 2.2}{\resizebox{0.3\linewidth}{6cm}{\fbox{b}}}%
\figureSeriesElement{Caption 2.3}{\resizebox{0.3\linewidth}{6cm}{\fbox{c}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 2.4}{\resizebox{0.3\linewidth}{5cm}{\fbox{d}}}%
\figureSeriesElement{Caption 2.5}{\resizebox{0.3\linewidth}{4cm}{\fbox{e}}}%
\figureSeriesElement{Caption 2.6}{\resizebox{0.3\linewidth}{3cm}{\fbox{f}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 2.7}{\resizebox{0.3\linewidth}{!}{\fbox{g}}}%
\figureSeriesElement{Caption 2.8}{\resizebox{0.3\linewidth}{!}{\fbox{h}}}%
\figureSeriesElement{Caption 2.9}{\resizebox{0.3\linewidth}{!}{\fbox{i}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 2.10}{\resizebox{0.3\linewidth}{3cm}{\fbox{j}}}%
\figureSeriesElement{Caption 2.11}{\resizebox{0.3\linewidth}{2cm}{\fbox{k}}}%
\figureSeriesElement{Caption 2.12}{\resizebox{0.3\linewidth}{2.5cm}{\fbox{l}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 2.13}{\resizebox{0.3\linewidth}{!}{\fbox{m}}}%
\figureSeriesElement{Caption 2.14}{\resizebox{0.3\linewidth}{6cm}{\fbox{n}}}%
\figureSeriesElement{Caption 2.15}{\resizebox{0.3\linewidth}{4cm}{\fbox{o}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 2.16}{\resizebox{0.3\linewidth}{3cm}{\fbox{p}}}%
\figureSeriesElement{Caption 2.17}{\resizebox{0.3\linewidth}{3cm}{\fbox{q}}}%
\figureSeriesElement{Caption 2.18}{\resizebox{0.3\linewidth}{3cm}{\fbox{r}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 2.19}{\resizebox{0.3\linewidth}{3cm}{\fbox{s}}}%
\figureSeriesElement{Caption 2.20}{\resizebox{0.3\linewidth}{3cm}{\fbox{t}}}%
\figureSeriesElement{Caption 2.21}{\resizebox{0.3\linewidth}{3cm}{\fbox{u}}}%
}}%
\lipsum[1-20]%
\end{document}%
```

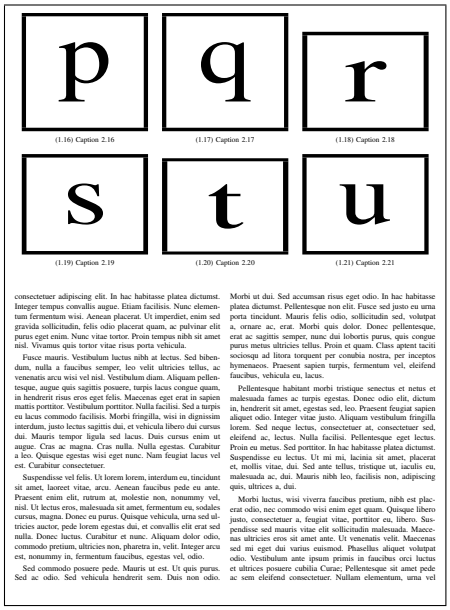
(2.1) Page 1 of the pdf compiled from Example 2.



(2.2) Page 2 of the pdf compiled from Example 2.



(2.3) Page 3 of the pdf compiled from Example 2.



(2.4) Page 4 of the pdf compiled from Example 2.

Figure 2: The rendered result of Example 2 (with trimmed page margins): A floating `figureSeries` in two-column mode.

2.3.3 Coalescing Figure Series in Two-Column Document

In Example 3, we put several floating figure series close to each other into a two-column document, again using the `IEEEtran` class [12]. The bodies of the figure series should coalesce without losing their captions, figure numbers, or identities. Since they coalesce, no empty pages are produced in between. The result is rendered as Figure 3.

Example 3 An example using the two-column `IEEEtrans` class and two coalescing figure series, rendered as Figure 3.

```
\documentclass{IEEEtran}%
\RequirePackage{graphicx}%
\RequirePackage{lipsum}%
\RequirePackage{figureSeries}%
\begin{document}%
\lipsum%
\figureSeriesFloat{%
My third figure series is small. It should float and merge with the following
series.\label{ser:3}%
}{%
\figureSeriesRow{%
\figureSeriesElement{Caption 3.1}{\resizebox{0.3\linewidth}{3cm}{\fbox{a}}}%
\figureSeriesElement{Caption 3.2}{\resizebox{0.3\linewidth}{3cm}{\fbox{b}}}%
\figureSeriesElement{Caption 3.3}{\resizebox{0.3\linewidth}{3cm}{\fbox{c}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 3.4}{\resizebox{0.3\linewidth}{4.2cm}{\fbox{d}}}%
\figureSeriesElement{Caption 3.5}{\resizebox{0.3\linewidth}{4.2cm}{\fbox{e}}}%
\figureSeriesElement{Caption 3.6}{\resizebox{0.3\linewidth}{4.2cm}{\fbox{f}}}%
}}%
This is a short text in between the two series~\ref{ser:3} and~\ref{ser:4},
which should not prevent them from merging.
\figureSeriesFloat{%
My fourth figure series is a bit longer. It should merge with the previous
series~\ref{ser:3}.\label{ser:4}%
}{
\figureSeriesRow{%
\figureSeriesElement{Caption 4.1}{\resizebox{0.3\linewidth}{!}{\fbox{g}}}%
\figureSeriesElement{Caption 4.2}{\resizebox{0.3\linewidth}{!}{\fbox{h}}}%
\figureSeriesElement{Caption 4.3}{\resizebox{0.3\linewidth}{!}{\fbox{i}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 4.4 is a very long caption. It will probably %
break into multiple lines. Does this matter? Let's find out.}{%
\resizebox{0.3\linewidth}{3cm}{\fbox{j}}}%
\figureSeriesElement{Caption 4.5}{\resizebox{0.3\linewidth}{2cm}{\fbox{k}}}%
\figureSeriesElement{Caption 4.6}{\resizebox{0.3\linewidth}{2.5cm}{\fbox{l}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 4.7}{\resizebox{0.3\linewidth}{!}{\fbox{m}}}%
\figureSeriesElement{Caption 4.8}{\resizebox{0.3\linewidth}{6cm}{\fbox{n}}}%
\figureSeriesElement{Caption 4.9}{\resizebox{0.3\linewidth}{4cm}{\fbox{o}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 4.10}{\resizebox{0.3\linewidth}{3cm}{\fbox{p}}}%
\figureSeriesElement{Caption 4.11}{\resizebox{0.3\linewidth}{3cm}{\fbox{q}}}%
\figureSeriesElement{Caption 4.12}{\resizebox{0.3\linewidth}{3cm}{\fbox{r}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 4.13}{\resizebox{0.3\linewidth}{3cm}{\fbox{s}}}%
\figureSeriesElement{Caption 4.14}{\resizebox{0.3\linewidth}{3cm}{\fbox{t}}}%
\figureSeriesElement{Caption 4.15}{\resizebox{0.3\linewidth}{3cm}{\fbox{u}}}%
}}%
\lipsum[1-20]%
\end{document}%
```

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.

Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

Sed commodo posuere pede. Mauris ut est. Ut quis purus. Sed ac odio. Sed vehicula hendrerit sem. Duis non odio. Morbi ut dui. Sed accumsan risus eget odio. In hac habitasse platea dictumst. Pellentesque non elit. Fusce sed justo eu urna porta tincidunt. Mauris felis odio, sollicitudin sed, volutpat a, ornare ac, erat. Morbi quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.

This is a short text in between the two series 1 and 2, which should not prevent them from merging. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel

(3.1) Page 1 of the pdf compiled from Example 3.

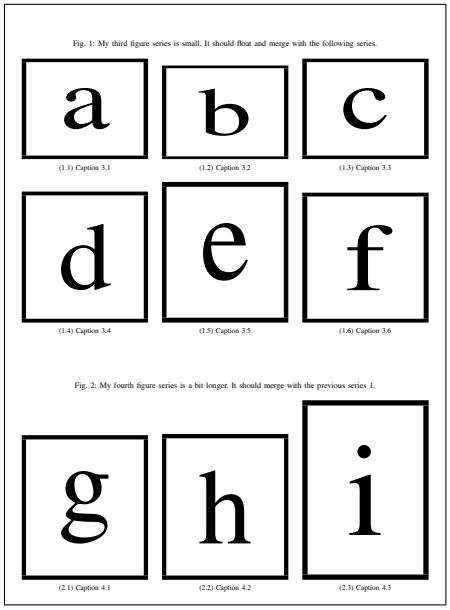


Fig. 1: My third figure series is small. It should float and merge with the following series.

a (1.1) Caption 3.1

b (1.2) Caption 3.2

c (1.3) Caption 3.3

d (1.4) Caption 3.4

e (1.5) Caption 3.5

f (1.6) Caption 3.6

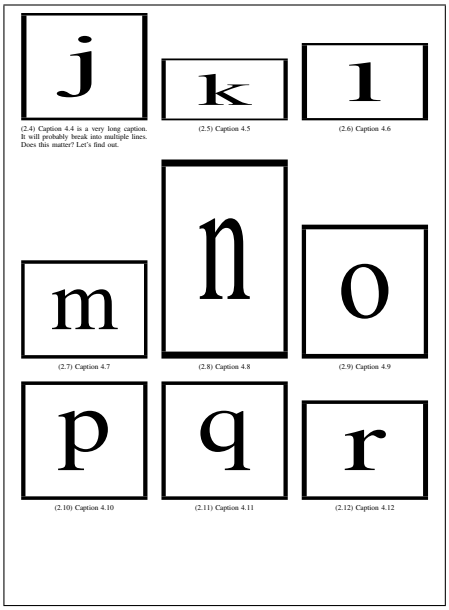
Fig. 2: My fourth figure series is a bit longer. It should merge with the previous series 1.

g (2.1) Caption 4.1

h (2.2) Caption 4.2

i (2.3) Caption 4.3

(3.2) Page 2 of the pdf compiled from Example 3.



j (2.4) Caption 4.4 is a very long caption. It will probably break into multiple lines. Does this matter? Let's find out.

k (2.5) Caption 4.5

l (2.6) Caption 4.6

m (2.7) Caption 4.7

n (2.8) Caption 4.8

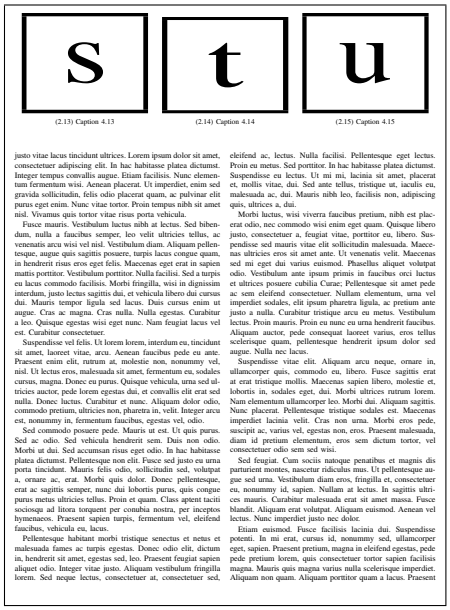
o (2.9) Caption 4.9

p (2.10) Caption 4.10

q (2.11) Caption 4.11

r (2.12) Caption 4.12

(3.3) Page 3 of the pdf compiled from Example 3.



s (2.13) Caption 4.13

t (2.14) Caption 4.14

u (2.15) Caption 4.15

justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.

Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

Sed commodo posuere pede. Mauris ut est. Ut quis purus. Sed ac odio. Sed vehicula hendrerit sem. Duis non odio. Morbi ut dui. Sed accumsan risus eget odio. In hac habitasse platea dictumst. Pellentesque non elit. Fusce sed justo eu urna porta tincidunt. Mauris felis odio, sollicitudin sed, volutpat a, ornare ac, erat. Morbi quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.

Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Donec odio elit, dictum in, hendrerit sit amet, egestas sed, leo. Praesent feugiat sapien aliquet odio. Integer vitae justo. Aliquam vestibulum fringilla lorem. Sed neque lectus, consectetuer at, consectetuer sed, eleifend ac, lectus. Nulla facilisi. Pellentesque eget lectus. Proin eu metus. Sed porttitor. In hac habitasse platea dictumst. Suspendisse eu lectus. Ut mi mi, lacinia sit amet, placerat et, mollis vitae, dui. Sed ante tellus, tristique ut, iaculis eu, malesuada ac, dui. Mauris nibh leo, facilisis non, adipiscing quis, ultrices a, dui.

Morbi luctus, wisi viverra faucibus pretium, nibh est placerat odio, nec commodo wisi enim eget quam. Quisque libero justo, consectetuer a, feugiat vitae, porttitor eu, libero. Suspendisse sed mauris vitae elit sollicitudin malesuada. Maecenas ultricies eros sit amet ante. Ut venenatis velit. Maecenas sed mi eget dui varius euismod. Phasellus aliquet volutpat odio. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Pellentesque sit amet pede ac sem eleifend consectetuer. Nullam elementum, urna vel imperdiet sodales, elit ipsum pharetra ligula, ac pretium ante justo a nulla. Curabitur tristique arcu eu metus. Vestibulum lectus. Proin mauris. Proin eu nunc eu urna hendrerit faucibus. Aliquam auctor, pede consequat laoreet varius, eros tellus scelerisque quam, pellentesque hendrerit ipsum dolor sed augue. Nulla nec lacus.

Suspendisse vitae elit. Aliquam arcu neque, ornare in, ullamcorper quis, commodo eu, libero. Fusce sagittis erat at erat tristique mollis. Maecenas sapien libero, molestie et, lobortis in, sodales eget, dui. Morbi ultrices rutrum lorem. Nam elementum ullamcorper leo. Morbi dui. Aliquam sagittis. Nunc placerat. Pellentesque tristique sodales est. Maecenas imperdiet lacinia velit. Cras non urna. Morbi eros pede, suscipit ac, varius vel, egestas non, eros. Praesent malesuada, diam id pretium elementum, eros sem dictum tortor, vel consectetuer odio sem sed wisi.

Sed feugiat. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Ut pellentesque augue sed urna. Vestibulum diam eros, fringilla et, consectetuer eu, nonummy id, sapien. Nullam at lectus. In sagittis ultrices mauris. Curabitur malesuada erat sit amet massa. Fusce blandit. Aliquam erat volutpat. Aliquam euismod. Aenean vel lectus. Nunc imperdiet justo nec dolor.

Etiam euismod. Fusce facilisis lacinia dui. Suspendisse potenti. In mi erat, cursus id, nonummy sed, ullamcorper eget, sapien. Praesent pretium, magna in eleifend egestas, pede pede pretium lorem, quis consectetuer tortor sapien facilisis magna. Mauris quis magna varius nulla scelerisque imperdiet. Aliquam non quam. Aliquam porttitor quam a lacus. Praesent

(3.4) Page 4 of the pdf compiled from Example 3.

Figure 3: The rendered result of Example 3 (with trimmed page margins): Two floating `figureSeries` in two-column mode are coalesced, without using their caption and identies.

2.3.4 Two-Column Document with `sig-alternate`

In the following Example 4, we test the `figureSeries` together for documents using ACM's `sig-alternate` [13] document class.

2.3.5 Many Small Sub-Figures in Two-Column Document

In the following Example 5 (again based on ACM's `sig-alternate` [13] document class), we put many small sub-figures into a figure. Also, the last paragraph of the text in the example is a reference to one of the sub-figures. The results are rendered as Figure 5.

2.3.6 Two `figureSeries` Separated by Text in Two-Column Document

In the following Example 6 (again based on ACM's `sig-alternate` [13] document class), we put two `figureSeries` which are separated by text. The results are rendered as Figure 6.

2.3.7 One Floating `figureSeries` in a Single-Column Document

In the following Example 7 (based on Springer's `llncs` [11] document class), we let the figure series from Example 1 float. You can compare the rendered in Figure 7 with those in Figure 1.

2.3.8 Mixed `figureSeries`, `figure`, and `figure*`

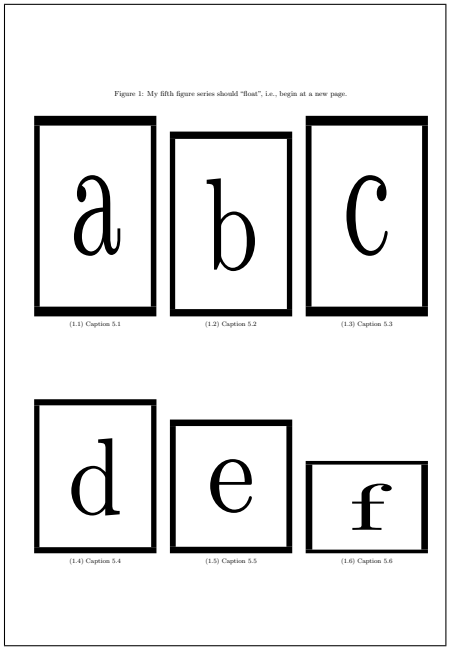
In Example 8, we mix `figureSeries` with `figure` and `figure*` environments. Something like this would cause `! LaTeX Error: Float(s) lost.` errors in version `0.9.2` of our package. Due to some modifications, this particular document now compiles, but the errors still appear in other documents.

We again use the `IEEEtran` class [12]. The result is rendered as Figure 8. As you can see, the ordering of the figures in the current version of our package (`0.9.4`) is far from perfect, but at least the document compiles. In a productive environment, you would have more text between your figures, so hopefully, such layout problems would not occur.

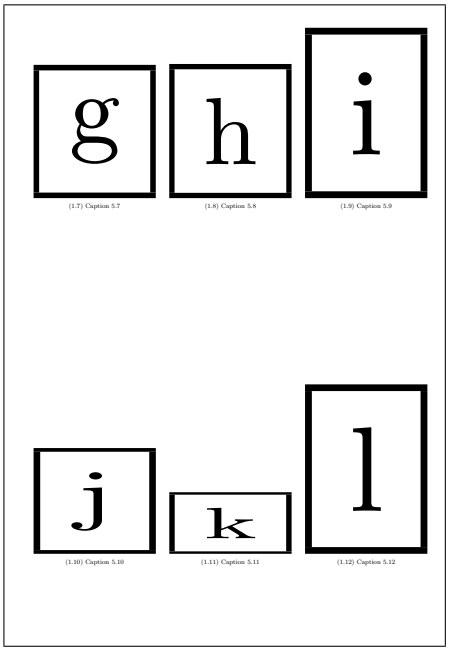
Example 4 An example featuring the two-column `sig-alternate` class. The results are rendered as Figure 4.

```
\documentclass{sig-alternate}
\RequirePackage{graphicx}%
\RequirePackage{lipsum}%
\RequirePackage{figureSeries}%
\begin{document}%
\lipsum[1]%
\figureSeriesFloat{%
My fifth figure series should ``float'', i.e., begin at a new page.%
}{%
\figureSeriesRow{%
\figureSeriesElement{Caption 5.1}{\resizebox{0.3\linewidth}{6cm}{\fbox{a}}}%
\figureSeriesElement{Caption 5.2}{\resizebox{0.3\linewidth}{6cm}{\fbox{b}}}%
\figureSeriesElement{Caption 5.3}{\resizebox{0.3\linewidth}{6cm}{\fbox{c}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 5.4}{\resizebox{0.3\linewidth}{5cm}{\fbox{d}}}%
\figureSeriesElement{Caption 5.5}{\resizebox{0.3\linewidth}{4cm}{\fbox{e}}}%
\figureSeriesElement{Caption 5.6}{\resizebox{0.3\linewidth}{3cm}{\fbox{f}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 5.7}{\resizebox{0.3\linewidth}{!}{\fbox{g}}}%
\figureSeriesElement{Caption 5.8}{\resizebox{0.3\linewidth}{!}{\fbox{h}}}%
\figureSeriesElement{Caption 5.9}{\resizebox{0.3\linewidth}{!}{\fbox{i}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 5.10}{\resizebox{0.3\linewidth}{3cm}{\fbox{j}}}%
\figureSeriesElement{Caption 5.11}{\resizebox{0.3\linewidth}{2cm}{\fbox{k}}}%
\figureSeriesElement{Caption 5.12}{\resizebox{0.3\linewidth}{5.5cm}{\fbox{l}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 5.13}{\resizebox{0.3\linewidth}{!}{\fbox{m}}}%
\figureSeriesElement{Caption 5.14}{\resizebox{0.3\linewidth}{6cm}{\fbox{n}}}%
\figureSeriesElement{Caption 5.15}{\resizebox{0.3\linewidth}{4cm}{\fbox{o}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 5.16}{\resizebox{0.3\linewidth}{3cm}{\fbox{p}}}%
\figureSeriesElement{Caption 5.17}{\resizebox{0.3\linewidth}{3cm}{\fbox{q}}}%
\figureSeriesElement{Caption 5.18}{\resizebox{0.3\linewidth}{3cm}{\fbox{r}}}%
}}%
\lipsum[1-20]%
\end{document}%
```

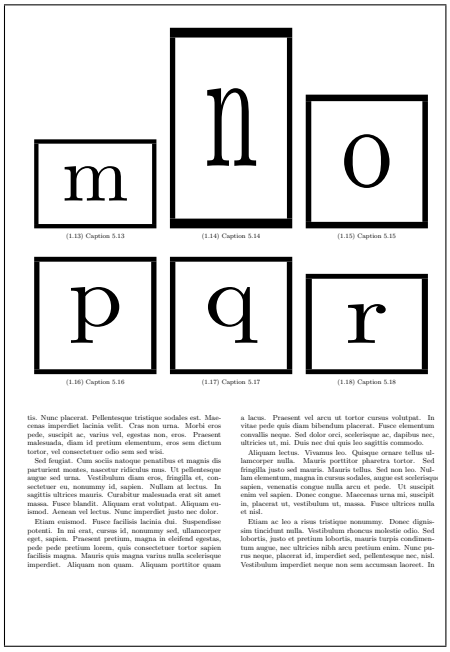
(4.1) Page 1 of the pdf compiled from Example 4.



(4.2) Page 2 of the pdf compiled from Example 4.



(4.3) Page 3 of the pdf compiled from Example 4.



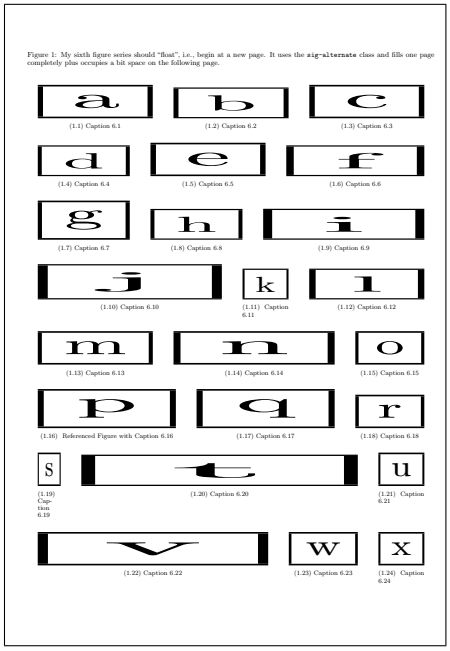
(4.4) Page 4 of the pdf compiled from Example 4.

Figure 4: The rendered result of Example 4 (with trimmed page margins): It works for `sig-alternate` too.

Example 5 An example featuring the two-column `sig-alternate` class with a reference to sub-figure. The results are rendered as Figure 5.

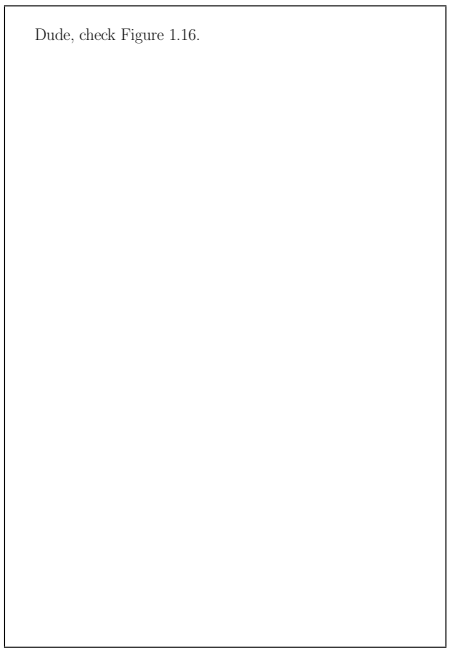
```
\documentclass{sig-alternate}
\RequirePackage{graphicx}%
\RequirePackage{lipsum}%
\RequirePackage{figureSeries}%
\begin{document}%
\lipsum[1]%
\figureSeriesFloat{%
My sixth figure series should ``float'', i.e., begin at a new page.
It uses the \texttt{sig-alternate} class and fills one page completely
plus occupies a bit space on the following page.%
}{%
\figureSeriesRow{%
\figureSeriesElement{Caption 6.1}{\resizebox{5cm}{1cm}{\fbox{a}}}%
\figureSeriesElement{Caption 6.2}{\resizebox{5cm}{1cm}{\fbox{b}}}%
\figureSeriesElement{Caption 6.3}{\resizebox{5cm}{1cm}{\fbox{c}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 6.4}{\resizebox{4cm}{1cm}{\fbox{d}}}%
\figureSeriesElement{Caption 6.5}{\resizebox{5cm}{1cm}{\fbox{e}}}%
\figureSeriesElement{Caption 6.6}{\resizebox{6cm}{1cm}{\fbox{f}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 6.7}{\resizebox{4cm}{1cm}{\fbox{g}}}%
\figureSeriesElement{Caption 6.8}{\resizebox{4cm}{1cm}{\fbox{h}}}%
\figureSeriesElement{Caption 6.9}{\resizebox{7cm}{1cm}{\fbox{i}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 6.10}{\resizebox{8cm}{1cm}{\fbox{j}}}%
\figureSeriesElement{Caption 6.11}{\resizebox{2cm}{1cm}{\fbox{k}}}%
\figureSeriesElement{Caption 6.12}{\resizebox{5cm}{1cm}{\fbox{l}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 6.13}{\resizebox{5cm}{1cm}{\fbox{m}}}%
\figureSeriesElement{Caption 6.14}{\resizebox{7cm}{1cm}{\fbox{n}}}%
\figureSeriesElement{Caption 6.15}{\resizebox{3cm}{1cm}{\fbox{o}}}%
}\figureSeriesRow{%
\figureSeriesElement{\label{checkThis}Referenced Figure with Caption 6.16}{%
\resizebox{6cm}{1cm}{\fbox{p}}}%
\figureSeriesElement{Caption 6.17}{\resizebox{6cm}{1cm}{\fbox{q}}}%
\figureSeriesElement{Caption 6.18}{\resizebox{3cm}{1cm}{\fbox{r}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 6.19}{\resizebox{1cm}{1cm}{\fbox{s}}}%
\figureSeriesElement{Caption 6.20}{\resizebox{12cm}{1cm}{\fbox{t}}}%
\figureSeriesElement{Caption 6.21}{\resizebox{2cm}{1cm}{\fbox{u}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 6.22}{\resizebox{10cm}{1cm}{\fbox{v}}}%
\figureSeriesElement{Caption 6.23}{\resizebox{3cm}{1cm}{\fbox{w}}}%
\figureSeriesElement{Caption 6.24}{\resizebox{2cm}{1cm}{\fbox{x}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 6.25}{\resizebox{7.5cm}{1cm}{\fbox{y}}}%
\figureSeriesElement{Caption 6.26}{\resizebox{7.5cm}{1cm}{\fbox{z}}}%
}}%
\lipsum[1-20]\par%
\huge{Dude, check Figure~\ref{checkThis}.}%
\end{document}%
```

(5.1) Page 1 of the pdf compiled from Example 5.



(5.2) Page 2 of the pdf compiled from Example 5.

(5.3) Page 3 of the pdf compiled from Example 5.

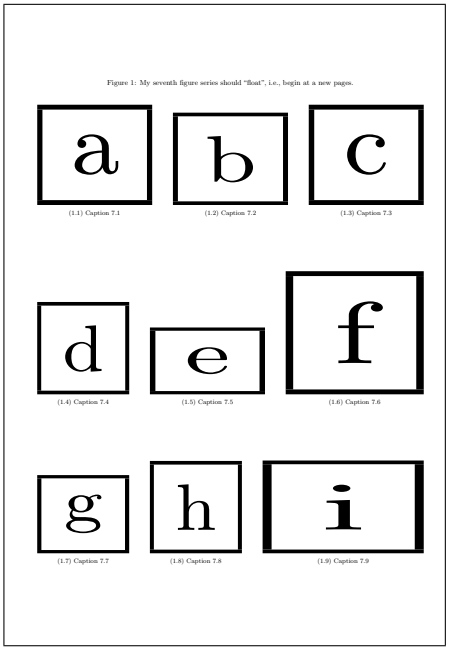


(5.4) Page 4 of the pdf compiled from Example 5.

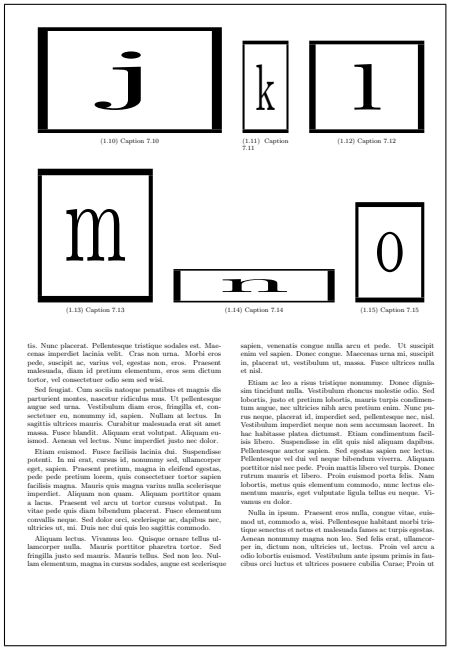
Figure 5: The rendered result of Example 5 (with trimmed page margins): Many small sub-figures nicely fill a page.

Example 6 An example featuring two figure series separated by text. The results are rendered as Figure 6.

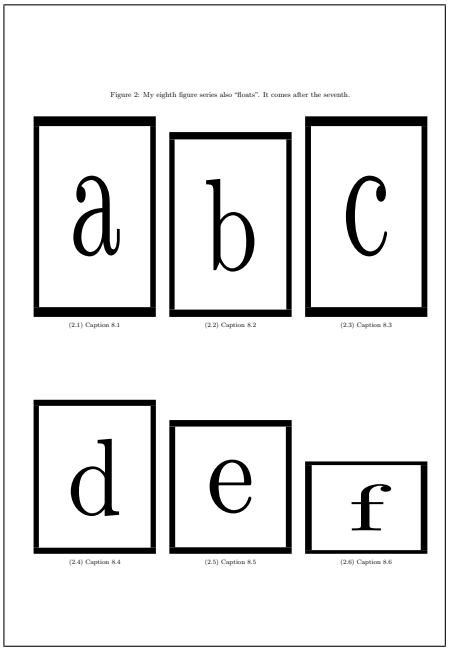
```
\documentclass{sig-alternate}
\RequirePackage{graphicx}%
\RequirePackage{lipsum}%
\RequirePackage{figureSeries}%
\begin{document}%
\lipsum[1]%
\figureSeriesFloat{%
My seventh  figure series should ‘‘float’’, i.e., begin at a new pages.%
}{%
\figureSeriesRow{%
\figureSeriesElement{Caption 7.1}{\resizebox{5cm}{3cm}{\fbox{a}}}%
\figureSeriesElement{Caption 7.2}{\resizebox{5cm}{3cm}{\fbox{b}}}%
\figureSeriesElement{Caption 7.3}{\resizebox{5cm}{3cm}{\fbox{c}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 7.4}{\resizebox{4cm}{3cm}{\fbox{d}}}%
\figureSeriesElement{Caption 7.5}{\resizebox{5cm}{2cm}{\fbox{e}}}%
\figureSeriesElement{Caption 7.6}{\resizebox{6cm}{4cm}{\fbox{f}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 7.7}{\resizebox{4cm}{2cm}{\fbox{g}}}%
\figureSeriesElement{Caption 7.8}{\resizebox{4cm}{3cm}{\fbox{h}}}%
\figureSeriesElement{Caption 7.9}{\resizebox{7cm}{3cm}{\fbox{i}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 7.10}{\resizebox{8cm}{3cm}{\fbox{j}}}%
\figureSeriesElement{Caption 7.11}{\resizebox{2cm}{3cm}{\fbox{k}}}%
\figureSeriesElement{Caption 7.12}{\resizebox{5cm}{3cm}{\fbox{l}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 7.13}{\resizebox{5cm}{4cm}{\fbox{m}}}%
\figureSeriesElement{Caption 7.14}{\resizebox{7cm}{1cm}{\fbox{n}}}%
\figureSeriesElement{Caption 7.15}{\resizebox{3cm}{3cm}{\fbox{o}}}%
}}%
\lipsum[1-30]%
\figureSeriesFloat{%
My eighth figure series also ‘‘floats’’. It comes after the seventh.%
}{%
\figureSeriesRow{%
\figureSeriesElement{Caption 8.1}{\resizebox{0.3\linewidth}{6cm}{\fbox{a}}}%
\figureSeriesElement{Caption 8.2}{\resizebox{0.3\linewidth}{6cm}{\fbox{b}}}%
\figureSeriesElement{Caption 8.3}{\resizebox{0.3\linewidth}{6cm}{\fbox{c}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 8.4}{\resizebox{0.3\linewidth}{5cm}{\fbox{d}}}%
\figureSeriesElement{Caption 8.5}{\resizebox{0.3\linewidth}{4cm}{\fbox{e}}}%
\figureSeriesElement{Caption 8.6}{\resizebox{0.3\linewidth}{3cm}{\fbox{f}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 8.7}{\resizebox{0.3\linewidth}{!}{\fbox{g}}}%
\figureSeriesElement{Caption 8.8}{\resizebox{0.3\linewidth}{!}{\fbox{h}}}%
\figureSeriesElement{Caption 8.9}{\resizebox{0.3\linewidth}{!}{\fbox{i}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 8.10}{\resizebox{0.3\linewidth}{3cm}{\fbox{j}}}%
\figureSeriesElement{Caption 8.11}{\resizebox{0.3\linewidth}{2cm}{\fbox{k}}}%
\figureSeriesElement{Caption 8.12}{\resizebox{0.3\linewidth}{8.5cm}{\fbox{l}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 8.13}{\resizebox{0.3\linewidth}{!}{\fbox{m}}}%
\figureSeriesElement{Caption 8.14}{\resizebox{0.3\linewidth}{6cm}{\fbox{n}}}%
\figureSeriesElement{Caption 8.15}{\resizebox{0.3\linewidth}{4cm}{\fbox{o}}}%
}}%
\lipsum[1-30]%
\end{document}%
```



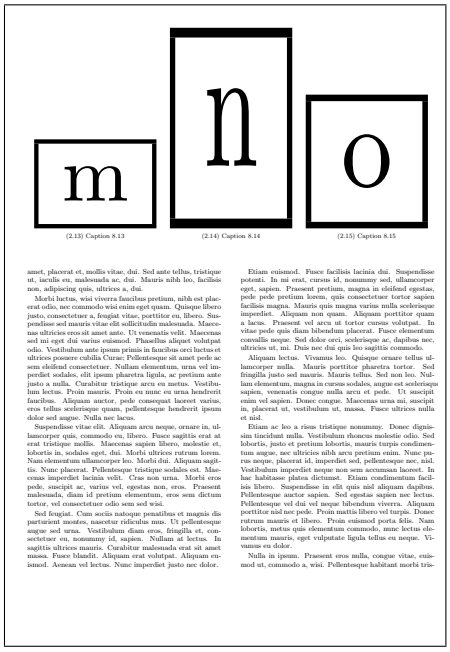
(6.1) Page 2 of the pdf compiled from Example 6.



(6.2) Page 3 of the pdf compiled from Example 6.



(6.3) Page 6 of the pdf compiled from Example 6.



(6.4) Page 8 of the pdf compiled from Example 6.

Figure 6: The rendered result of Example 6 (with trimmed page margins): Two `figureSeries` are separated by text.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.

(7.1) Page 1 of the pdf compiled from Example 7.

Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

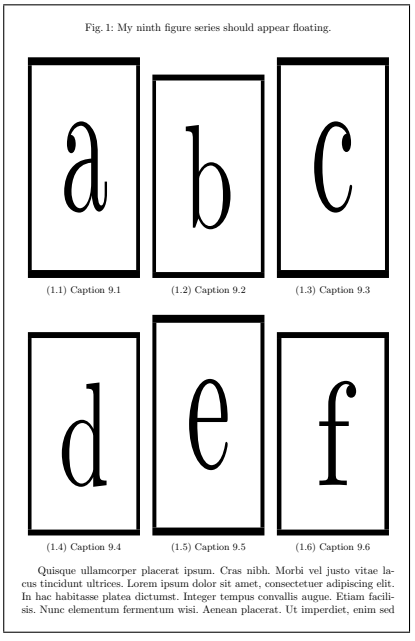
Sed commodo posuere pede. Mauris ut est. Ut quis purus. Sed ac odio. Sed vehicula hendrerit sem. Duis non odio. Morbi ut dui. Sed accumsan risus eget odio. In hac habitasse platea dictumst. Pellentesque non elit. Fusce sed justo eu urna porta tincidunt. Mauris felis odio, sollicitudin sed, volutpat a, ornare ac, erat. Morbi quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

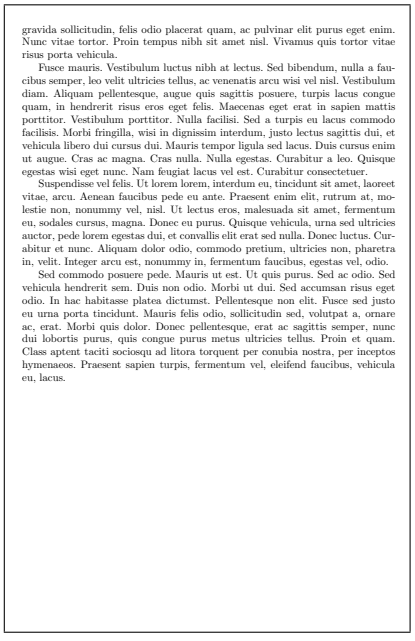
Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

(7.2) Page 2 of the pdf compiled from Example 7.



Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed

(7.3) Page 3 of the pdf compiled from Example 7.



gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.

Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

Sed commodo posuere pede. Mauris ut est. Ut quis purus. Sed ac odio. Sed vehicula hendrerit sem. Duis non odio. Morbi ut dui. Sed accumsan risus eget odio. In hac habitasse platea dictumst. Pellentesque non elit. Fusce sed justo eu urna porta tincidunt. Mauris felis odio, sollicitudin sed, volutpat a, ornare ac, erat. Morbi quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.

(7.4) Page 4 of the pdf compiled from Example 7.

Figure 7: The rendered result of Example 7 (with trimmed page margins): A `figureSeries` floating in one-column mode (see Example 1 for the non-floating version).


Test Example: Mixed figure, figure*, and figureSeries

Thomas Weise

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.

Fig. 3: Sodales condimentum nascetur tempus?

Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

Sed commodo posuere pede. Mauris ut est. Ut quis purus. Sed ac odio. Sed vehicula hendrerit sem. Duis non odio. Morbi ut dui. Sed accumsan risus eget odio. In hac habitasse platea dictumst. Pellentesque non elit. Fusce sed justo eu urna porta tincidunt. Mauris felis odio, sollicitudin sed, volutpat a, ornare ac, erat. Morbi quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.

Etiam ac leo a risus tristique nonummy. Donec dignissim tincidunt nulla. Vestibulum rhoncus molestie odio. Sed lobortis, justo et pretium lobortis, mauris turpis condimentum augue, nec ultricies nibh arcu pretium enim. Nunc purus neque, placerat id, imperdiet sed, pellentesque nec, nisl. Vestibulum imperdiet neque non sem accumsan laoreet. In hac habitasse platea dictumst. Etiam condimentum facilisis libero. Suspendisse in elit quis nisl aliquam dapibus. Pellentesque auctor sapien. Sed egestas sapien nec lectus. Pellentesque vel dui vel neque bibendum viverra. Aliquam porttitor nisl nec

(8.1) Page 1 of the pdf compiled from Example 8.

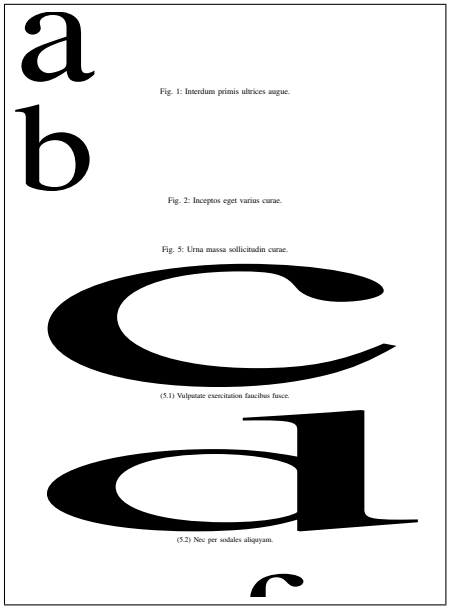


Fig. 1: Interdum primis ultrices augue.

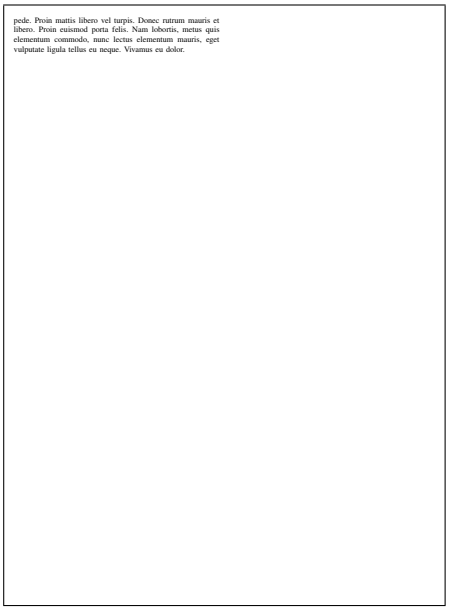
Fig. 2: Inceptos eget varius curae.

Fig. 5: Urna massa sollicitudin curae.

(5.1) Vulputate exercitation faucibus fusce.

(5.2) Nec per sodales aliquyam.

(8.2) Page 2 of the pdf compiled from Example 8.


pede. Proin mattis libero vel turpis. Donec rutrum mauris et libero. Proin euismod porta felis. Nam lobortis, metus quis elementum commodo, nunc lectus elementum mauris, eget vulputate ligula tellus eu neque. Vivamus eu dolor.

(8.3) Page 3 of the pdf compiled from Example 8.

Figure 8: The rendered result of Example 8 (with trimmed page margins): a mixture of `figureSeries`, `figure`, and `figure*`.

Example 7 An example using the one-column `llncs` class, rendered as Figure 7.

```
\documentclass{llncs}%
\RequirePackage{graphicx}%
\RequirePackage{lipsum}%
\RequirePackage{figureSeries}%
\begin{document}%
\lipsum%
\figureSeriesFloat{%
My ninth figure series should appear floating.%
}{%
\figureSeriesRow{%
\figureSeriesElement{Caption 9.1}{\resizebox{0.3\linewidth}{5cm}{\fbox{a}}}%
\figureSeriesElement{Caption 9.2}{\resizebox{0.3\linewidth}{5cm}{\fbox{b}}}%
\figureSeriesElement{Caption 9.3}{\resizebox{0.3\linewidth}{5cm}{\fbox{c}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 9.4}{\resizebox{0.3\linewidth}{5cm}{\fbox{d}}}%
\figureSeriesElement{Caption 9.5}{\resizebox{0.3\linewidth}{5cm}{\fbox{e}}}%
\figureSeriesElement{Caption 9.6}{\resizebox{0.3\linewidth}{5cm}{\fbox{f}}}%
}}%
\lipsum%
\end{document}%
```

Example 8 An example for a mixture of `figureSeries`, `figure`, and `figure*`, Figure 8.

```
\documentclass{IEEEtran}%
\RequirePackage{lipsum}%
\RequirePackage{graphicx}%
\RequirePackage{figureSeries}%
%
\begin{document}%
%
\title{Test Example: Mixed figure, figure*, and figureSeries}%
\author{Thomas Weise}%
\maketitle%
%
\begin{figure*}%
\resizebox{0.19\linewidth}{0.12\textheight}{a}%
\caption{Interdum primis ultrices augue.}%
\end{figure*}
%
\lipsum[1-7]%
%
\begin{figure*}%
\resizebox{0.19\linewidth}{0.15\textheight}{b}%
\caption{Inceptos eget varius curae.}%
\end{figure*}%
%
\figureSeriesFloat{Urna massa sollicitudin curae.}{%
\figureSeriesRow{%
\figureSeriesElement{Vulputate exercitation faucibus fusce.}{%
\resizebox{0.95\linewidth}{0.21\textheight}{c}}%
}%
\figureSeriesRow{%
\figureSeriesElement{Nec per sodales aliquyam.}{%
\resizebox{0.95\linewidth}{0.21\textheight}{d}}%
}%
}%
%
\begin{figure}%
\resizebox{0.31\columnwidth}{0.13\textheight}{e}%
\caption{Sodales condimentum nascetur tempus?}%
\end{figure}%
%
\begin{figure}%
\resizebox{0.31\columnwidth}{0.15\textheight}{f}%
\caption{Soluta autem nascetur litora.}%
\end{figure}%
%
\lipsum[14]%
%
\end{document}%
```

3 Implementation

The names of all macros for public use are prefixed with `figureSeries`. The names of all internal elements of the package are prefixed with `@figSer@`. This naming convention should prevent any name clashes with other packages.

3.1 Loading of Required Packages

Our `figureSeries` package requires three other packages:

1. The package `caption` [5] for the caption of the `figureSeries`.
2. The package `subcaption` [6] for sub-figure layout and captions.
3. The package `afterpage` [7] for creating the impression that our `figureSeries` can float.
4. The package `cuted` [8] for laying out the figure series in two-column mode.

```
%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%% Preamble %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%
```

3.1.1 Loading `caption` and `subcaption`

We rely on the packages `caption` and `subcaption` to render the `figureSeries`' and sub-figure's captions. However, Springer's `llncs.cls` [11] seems to be incompatible with the `subcaption` package [6][1]. Yet, we need that package for giving nice captions to the sub-figures. Therefore, we load the `caption` package [5] with option `compatibility=false` (which can solve this issue) if necessary. This is behavior governed by the Boolean flag `@figSer@captionCompatibilityFalse`, initialized to `false`.

```
\newif\if@figSer@captionCompatibilityFalse%
\@figSer@captionCompatibilityFalsefalse%
%
```

After the flag has been allocated and set to `false`, we check for Springer's `llncs.cls` (in a crude way). In case of `llncs.cls`, if we do not set the option `compatibility` of the `caption` package to `false`, we will get the error *! Package caption Error: The 'subcaption' package does not work correctly in compatibility mode.*

```
\ifx\spnewtheorem\@undefined%
\else%
\@figSer@captionCompatibilityFalsetrue%
\fi%
%
```

[1] According to `http://www.michaelshell.org/tex/ieeetran/`, IEEE's `IEEEtrans.cls` [12] may also be incompatible, but it seems to works here.

Now we can load the `caption` [5] package with the right "`compatibility`" setting.

```
\if@figSer@captionCompatibilityFalse%
\RequirePackage[compatibility=false]{caption}%
\else%
\RequirePackage{caption}%
\fi%
```

We now load the `subcaption` package [6] and set the caption style for sub-figures to arabic. The reason is that we may have many sub-figures, too many for indexes ranging only from *a)* to *z)*. By using arabic numbers, we are on the safe side.

```
\RequirePackage{subcaption}%
\DeclareCaptionSubType*[arabic]{figure}%
```

3.1.2 Loading the `afterpage` Package

Floating objects cannot break across pages, so we cannot really make our figure series float. However, by using the `afterpage` [7] package, we can make it look as if it was floating by rendering it on the next page.

```
\RequirePackage{afterpage}%
```

3.1.3 Loading the `cuted` Package

In two-column mode, we need to temporarily switch to one-column mode to lay out the figure series. Therefore, we use the `strip` environment from package `cuted` [8].

```
\RequirePackage{cuted}%
```

3.2 User Interface Macros

This section contains the macros which the package user can/should access, i.e., those macros which have been shortly discussed in Section 2.2.

```
%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%% User Interface %%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%
```

`\figureSeriesElement` The macro `\figureSeriesElement{`⟨*caption*⟩`}{`⟨*contents*⟩`}` inserts an element of the figure series, i.e., one sub-figure. Its first argument is the caption of the element. This argument also may contain a `\label`. The second argument is the graphic to print. It could, e.g., be a call to `\includegraphic` from the `graphicx` package [9].

Spacing between sub-figures is handled dynamically via `\hfill`. We make sure to tell the `subcaption` that the sub-figures are sub-figures by setting `@captype` appropriately.

```
%%
```

```
%% Insert an element of the figure series, i.e., a sub-figure.
%% #1 the caption of the sub-figure, potentially including a |\label|
%% #2 the contents of the sub-figure, likely a call to |\includegraphicx|
\long\gdef\figureSeriesElement#1#2{%
\strut\hfill\strut%
\edef\@captype{figure}%
\subcaptionbox{#1}{#2}%
\strut\hfill\strut%
}%
```

`\figureSeriesRow` `\figureSeriesRow{`⟨*contents*⟩`}` inserts a new row of elements (sub-figures) into the figure series. Its single argument should thus contain a sequence of `\figureSeriesElement`s. Since sub-figures are placed row-by-row, no sub-figure can span multiple rows.

If the overall caption of the figure series has not yet been printed, it would be stored in `\@figSer@delayedCaption`. Thus, if `\@figSer@delayedCaption` is not empty, this macro first prints the delayed caption and then the contents of the row together in a `\parbox` command which is wrapped into a `center` environment.

Again, the reason why we need to delay caption printing is that LaTeX's page breaking algorithm may separate the caption from the first figure row if the figure series starts close to the bottom of the page. Thus, we pack the delayed caption together with the first row of figures into a `\parbox` command. `\parbox`es are (hopefully) not affected by page breaking and (hopefully) always remain as solid objects. If the caption has already been printed, i.e., `\@figSer@delayedCaption` is empty, we do not need the awkward `\parbox`.

Plain `\parbox`es, however, seem to not work we with the breaking of the `figureSeries` into multiple pieces to facilitate page breaking later on. Thus, we (need to?) wrap everything into a `center` environment.

```
%%
%% Insert a row of sub-figures into the figure series.
%% #1 the contents of the rows: arbitrarily many calls to |\figureSeriesElement|
\long\gdef\figureSeriesRow#1{%
\begin{center}%
\ifx\@figSer@delayedCaption\@empty%
\vspace\abovecaptionskip%
\strut#1\strut%
\else%
\parbox[b]{\textwidth}{%
\@figSer@delayedCaption%
\global\let\@figSer@delayedCaption\@empty%
\vspace\abovecaptionskip%
\strut#1\strut%
}%
\fi%
\end{center}%
}%
```

The following two macros, `\figureSeriesHere` and `\figureSeriesFloat` act as switches that decide which special situation applies, as different things have to be done for

1. the non-floating ("Here") or floating ("Float") case, as well as for
2. one-column or two-column documents.

`\figureSeriesHere` The macro `\figureSeriesHere{`⟨*caption*⟩`}{`⟨*contents*⟩`}` tries to insert a non-floating figure series at the current position in the document. This means that it may begin wherever, well, it is defined, e.g., in the middle of the page.

The macro has two mandatory parameters, the caption and the contents. The caption will (different from usual `figure`s) be put at the beginning of the figure series. The reason is that a figure series may span over multiple pages and having the caption at the end may be awkward. The caption text may contain a `\label`.

The contents of a figure series should be a sequence of `\figureSeriesRow` calls.

Since figure series are page-wide elements, starting them in the middle of the page only works in one-column documents. In two-column documents, any figure series will behave as specified in macro `\figureSeriesFloat` below.

Furthermore, if a floating figure series is already pending for insertion, we will not print the current figure series here but attach it to the floating one. This will ensure that the order in which figure series' are printed is always the same as the order in which they are declared.

```
%%
%% Insert a figure series right here, i.e., at the location at which this
%% function is called.
%% Exceptions: This function will behave like \figureSeriesFloat if 1. a
%% floating figure series already pending and 2. in two-column documents.
%% #1 the caption of the figure series, potentially including a |\label|
%% #2 the contents of the figure series: arbitrarily many calls to
%%    |\figureSeriesRow|
\long\def\figureSeriesHere#1#2{%
\ifx\@figSer@floatingBody\@empty%
\if@twocolumn%
\@figSer@store{#1}{#2}%
\afterpage{\@figSer@deferred}%
\else%
\@figSer@print{#1}{#2}%
\fi%
\else%
\@figSer@store{#1}{#2}%
\fi%
}%
```

`\figureSeriesFloat` The macro `\figureSeriesFloat{`⟨*caption*⟩`}{`⟨*contents*⟩`}` takes the same parameters as `\figureSeriesHere`, but has a float-like behavior. By using the `\afterpage` command from the `afterpage` package [7], we let it start at the following page. This is different from LaTeX' normal floating behavior, but as good as we can get with page-breaking objects, I think.

```
%%
%% Insert a floating figure series right here, i.e., one which will be
%% laid out on top of the following page.
%% #1 the caption of the figure series, potentially including a |\label|
%% #2 the contents of the figure series: arbitrarily many calls to
%%    |\figureSeriesRow|
\long\gdef\figureSeriesFloat#1#2{%
\ifx\@figSer@floatingBody\@empty%
\@figSer@store{#1}{#2}%
\afterpage{\@figSer@deferred}%
\else%
\@figSer@store{#1}{#2}%
\fi%
}%
```

3.3 Internal Utility Definitions and Macros

Here we discuss the internal utility definitions and macros used by our figure series.

```
%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%% Internal Macros %%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%
```

3.3.1 Container Macros

We use the command `\@figSer@floatingBody` to temporarily store any floating figure series. If this command is `\@empty`, no floating figure series is pending.

```
\global\let\@figSer@floatingBody\@empty%
```

We want to avoid having a figure series broken right below the caption, i.e., having a caption alone at the bottom of a page and the first row of sub-figures coming on the next page. Therefore, we temporarily store the overall caption of the figure series in `\@figSer@delayedCaption` and print it together with the first figure row.

```
\global\let\@figSer@delayedCaption\@empty%
```

Our figure series are basically nothing else than simple arrays of rows. Each `\figureSeriesRow` is wrapped into a `center` environment and the `\figureSeriesElement`s are horizontally distributed inside using `\strut`s and `\hfill`s.

Here we define the macro for printing our figure series. The rest of the package will deal with the logic where and how to invoke it.

`\@figSer@print` The macro `\@figSer@print{`⟨*caption*⟩`}{`⟨*contents*⟩`}` does the work of printing the figure series.

```
\long\def\@figSer@print#1#2{%
\def\@figSer@delayedCaption{%
\noindent\parbox{\textwidth}{%
\captionof{figure}{#1}%
\global\advance\c@figure by 0%
```

```
}%
\par}%
\begin{center}%
#2%
\end{center}%
\medskip%
}%
```

`\@figSer@store` If we want to make a figure series float, we need to temporarily store it. If another figure series is already stored, we attach the new one at its end. We store a figure series in `\@figSer@floatingBody` for later layout with the macro `\@figSer@store{`⟨*caption*⟩`}{`⟨*contents*⟩`}`.

```
\long\def\@figSer@store#1#2{%
\g@addto@macro{\@figSer@floatingBody}{\@figSer@print{#1}{#2}}%
}%
```

`\@figSer@deferred` This macro is used to lay out the figure series in a "deferred" way, i.e., when we emulate floating behavior via `\afterpage`. It behaves differently in one- and two-column mode.

In one-column mode, there is nothing much to do: The figure series is stored in `\@figSer@floatingBody` and we just need to print it.

In two column mode, we should only print it if we are in the first column. Otherwise, there may be errors. Thus, if we are not in the first column, we simply defer again, via `\afterpage`. For actually printing the figure series, we then use the `strip` environment from package `cuted` [8].

```
\def\@figSer@deferred{%
\if@twocolumn%
\if@firstcolumn%
\begin{strip}\@figSer@floatingBody\end{strip}%
\global\let\@figSer@floatingBody\@empty%
\else%
\afterpage{\@figSer@deferred}%
\fi%
\else%
\@figSer@floatingBody%
\global\let\@figSer@floatingBody\@empty%
\fi%
}%
```

3.3.2 Empty Documents

Empty documents pose a threat. If no page is to end, the contents of `\afterpage` will not be invoked. Hence, we add a hook via `\AtEndDocument`. Sometimes figure series may get lost even though we have this hook.

```
\AtEndDocument{%
\ifx\@figSer@floatingBody\@empty%
\else%
\clearpage%
```

```
\fi%
}%
```

3.4 Errors, Tests, and Incompatibilities

Currently, the biggest issue with the package is that sometimes, figure series may simply get lost, i.e., not be printed. The reason for this is not yet clear. However, it seems to be rooted in the `strip` environment: If you have such an environment in an otherwise empty document, it will not be laid out. That looks similar to the isse we observe here.

Also, we may sometimes get `! Dimension too large.` errors. These may be caused by too-long `figureSeries` or too-big sub-figures.

`figureSeries` loads the packages `caption` [5], `subcaption` [6], `afterpage` [7], and `cuted` [8]. Therefore it inherits all incompatibilities of these packages. The `subcaption` package, for instance, is not compatible with the packages `subfigure` and `subfig`.

3.5 Related Work

The `longfigure` package [14] provides a similar functionality, i.e., a figure environment that can wrap over multiple pages. This environment can be made to float by using `\afterpage`, but does not work in two-column documents.

Tomáš Hejda's method [15] was originally used in our package to lay out figure series. However, I often got `! LaTeX Error: Float(s) lost.` errors in conjunction with `\afterpage`. With the 'strip' environment from package `cuted` [8], I do not get those errors anymore (but sometimes my figure series may disappear...).

3.6 License

References

[1] Thomas Weise, Raymond Chiong, Ke Tang, Jörg Lässig, Shigeyoshi Tsutsui, Wenxiang Chen, Zbigniew Michalewicz, and Xin Yao. Benchmarking Optimization Algorithms: An Open Source Framework for the Traveling Salesman Problem. *IEEE Computational Intelligence Magazine (CIM)*, 9 (3), August 2014. doi: 10.1109/MCI.2014.2326101, http://www.it-weise.de/documents/files/WCTLTCMY2014BOAAOSFFTTSP.pdf

[2] Hemant Ritturaj Kushwah. Subfigs of a Figure on Multiple Pages, July 3, 2009. URL http://stackoverflow.com/questions/1078370.

[3] arjmage and Hendrik Vogt. Splitting subfigures across multiple pages – but programmatically!, February 14, 2011. URL http://tex.stackexchange.com/questions/11059.

[4] Hanns-Martin Münch and Don Hosec *The morefloats Package*, January 28, 2012, version v1.0f URL http://www.ctan.org/pkg/morefloats

[5] Axel Sommerfeldt. *The caption Package – Customising captions in floating environments*, November 2, 2011. URL http://www.ctan.org/pkg/caption.

[6] Axel Sommerfeldt. *The subcaption package – Support for sub-captions*, April 16, 2013. URL http://www.ctan.org/pkg/subcaption.

[7] David P. Carlisle. *The afterpage Package – Execute command after the next page break*, October 27, 1995. URL http://www.ctan.org/pkg/afterpage.

[8] Sigitas Tolušis. *The cuted package. v1.5*, October 04, 2012. URL http://ctan.org/pkg/cuted.

[9] David P. Carlisle and Sebastian Rahtz. *Packages in the 'graphics' bundle*, April 27, 2014. URL http://www.ctan.org/pkg/graphicx.

[10] Patrick Happel. *lipsum – Access to 150 paragraphs of Lorem ipsum dummy text*, July 27, 2014. URL http://www.ctan.org/pkg/lipsum.

[11] LLNCS Document Class – Springer Verlag LaTeX2e support for Lecture Notes in Computer Science, June 12, 2010. URL ftp://ftp.springer.de/pub/tex/latex/llncs/latex2e/llncs2e.zip.

[12] Gerald Murray, Silvano Balemi, Jon Dixon, Peter Nüchter, Jürgen von Hagen, and Michael Shell. Official IEEE LaTeX Class for Authors of the Institute of Electrical and Electronics Engineers (IEEE) Transactions Journals and Conferences, May 3, 2007. URL http://www.michaelshell.org/tex/ieeetran/.

[13] Gerald Murray and G.K.M. Tobin. SIG-ALTERNATE.CLS – Version 2.4 (Compatible with the ACM_PROC_ARTICLE-SP.CLS" V3.2SP), April 22, 2009. URL http://www.acm.org/sigs/publications/proceedings-templates.

[14] Tim Arnold. *The longfigure Package – Provides a figure-like environment that break over pages*, January 6, 2014. URL `http://www.ctan.org/pkg/longfigure`.

[15] Tomáš Hejda (answer, email: tohecz@gmail.com), Augustin (question) *Multi-Page One-Column Abstract in a Two-Column Document*, September 27, 2012. URL `http://tex.stackexchange.com/questions/74433`.

Change History

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.