Benefits, care and feeding of the `bigfoot` package

David Kastrup
dak (at) gnu dot org

Abstract

The `bigfoot` package for arranging footnote apparatus for text-critical editions offers several advantages for 'ordinary' documents as well. The author plans to release a few enhancements in time for the EuroBachoTEX conference which will further help in making it useful for other documents without having to think too much.

In the easiest case, just using `\usepackage{bigfoot}` in your preamble should provide for better page breaks and footnote arrangements.

There are, unfortunately, also some possible conflicts with other packages. The talk will focus on how to address them, and possibilities of still using `bigfoot` in such cases.

1 Advanced features of `bigfoot`

`bigfoot` has been designed to deal with the typesetting needs of a complicated critical edition. As a consequence, it offers multiple footnote apparatus. For doing that, it builds upon the interfaces and functionality of the `manyfoot` package. However, its functionality far exceeds that of `manyfoot`. It is, for example, also possible to anchor footnotes within any footnote apparatus previously on the page as well as in the main text (if the original author already used footnotes, not uncommon in critical editions from the last few centuries, comments on both his main text as well as his footnotes have to be permitted). In connection with the supporting package `perpage`, the numbering and order irregularities caused by being able to anchor footnotes in different other blocks get ironed out to get a natural page order.

Most talks about `bigfoot` have focused on demonstrating how `bigfoot` is able to deal pleasingly with the special demands of typesetting critical editions.

So what does `bigfoot` offer the average user? Let us first analyze what TEX does not offer.

2 The problems with TEX's footnotes

Footnotes are one of TEX's weakest points, and the principal weakness is breaking them. As soon as a footnote does not fit completely on one page, TEX's global pagebreak optimization gets completely bypassed.

What TEX does upon encountering a footnote that will not fit on the current page is tentatively split it to fit in the remaining page size, using the standard `\vsplit` operation and registering the natural size to put on the current page. It then proceeds with the normal page accumulation and breaking.

There are so many things wrong with this approach that it is not easy to list them. The first thing wrong is that only one break of the footnote will be considered, though it may be more appropriate to break the footnote earlier and get more main text material instead. The worst aspect is that the split of the footnote is calculated before it is even clear that there will be a corresponding legal breakpoint in the main text!

If, for example, widows (page breaks before the last line of a paragraph) are not permitted by setting `\widowpenalty` to 10000, an action not uncommon in document classes, a footnote anchored in the second to last line of a paragraph will simply not get broken in normal circumstances, since the break of the footnote will be determined without taking into account that a line of the main text is still forced to follow.

Another problem is that the `\vsplit` operation takes into account any existing shrinkability in the top part of the split, thus possibly cramming more material into it than would 'naturally' fit. But since TEX considers only the natural height of the split part when it comes to page break decision time, it can happen that the split was chosen in a manner that lets TEX look at an overfull page. Again, this means that the footnote can't be placed at all on the current page.

And we are not even talking about multiple footnotes yet ...

3 Features

So what are the features that `bigfoot` provides for the case of a 'normal', single apparatus?

Robustness `\verbatim` commands are allowed in footnotes. This is actually not as much a deficiency of TEX, but rather of the implementation in LATEX. Plain TEX has working functionality in this area.

The problem with LATEX lies in the footnote being scanned first as a macro argument. This is usually done by the typically document-class dependent `\@makefntext` command. The trickery `bigfoot` does here is too awful to describe, yet astonishingly works with most typical definitions of this macro. Where it doesn't, one can specify the `fragile` option to the `bigfoot` package, and this magic will not get used.

Optimization Footnote breakpoints are reconsidered for each possible breakpoint of the main text. This means that TEX will find the best combination of breaks in main text and footnote. In contrast, the default behavior examines just a single break possibility for a footnote, and this possibility might even be infinitely bad.

Color continuity When a footnote breaks across pages, the color stack is maintained properly. Color is handled in LATEX with the help of specials that switch the color (and, in the case of `dvips`, restore it afterwards with the help of a color stack). Restarting the footnote on the next page with the proper color is something that has never worked in LATEX. Now it simply does. It has to be noted that pdfTEX 1.40, the version in TEX Live 2007, has a built-in color stack feature that can be used to similar effect in PDF mode. It won't be likely to help in DVI mode, though.

Paragraph footnotes Footnotes may be set in a compact form in one running paragraph where this seems feasible. While `manyfoot` and `fnpara` also offer this arrangement, `bigfoot` offers a superior solution in several respects:

- The line breaking can be chosen much more flexibly: with appropriate customization, it is possible to fine-tune quite well when and where stuff will be placed in the same line, and when starting a new line will be preferred.
- Such in-paragraph footnotes can be broken across pages automatically, just like normal footnotes. They will only be broken after the last footnote in the block has started.
- Pages will not become over- or underfull because of misestimating of the size of in-paragraph footnotes.
- The decision of whether to make a footnote in-paragraph or standalone can be changed for each footnote apparatus at any time, including on mid-page. In fact, you can make this decision for each footnote separately. Since display math requires vertical mode footnotes, this is convenient.
- `bigfoot` will make a good-faith effort to adapt the normal footnote layout provided by the document class with the macros `\@makefnmark` and `\@makefntext` to in-paragraph footnotes.

Fewer catastrophes Split footnotes will not get jumbled in the presence of floats. `bigfoot` is not afflicted by this bug in LATEX's output routine since it does not delegate the task of splitting footnotes to TEX in the first place. While the faulty output routine of LATEX may still jumble the order of footnotes in that particular case (when one footnote gets held over as an insertion 'floated' at infinite cost), `bigfoot` will sort the jumbled footnotes back into order before processing them.

However, it must be noted that the bug of a footnote getting detached from its anchor line when followed by a float anchored on the same line is still present: the marks that `bigfoot` employs instead of insertions for keeping track of the insertion positions can get detached in the same manner.

4 Drawbacks in practice

- Since `bigfoot` meddles considerably with the output routine's workings, interoperation with other packages doing the same might be problematic. Considerable effort has been spent on minimizing possibly bad interactions, but the results might not always be satisfactory and, at the very least, might depend on the load order of packages. So playing around with the load order might help.
- The underlying `manyfoot` changes some LATEX internals. Packages that do similar operations might clash. One such clash has very recently been addressed in `jurabib`.
- It slows things down. In practice, this is most noticeable for multiple apparatus where there are no good alternatives, anyway.
- The complexity of the package makes it more likely for things to go wrong in new ways.[1]

[1] Most of those problems should arise under requirements that could not possibly be met without the package, so this

- The robustification of footnotes might not work with all document classes. It is worth trying to load the `bigfoot` package with the `fragile` package option. This has been made available only recently.
- The version distributed in TEX Live 2007 can still get overfull pages and suboptimal breaks. A revision is underway and should be finished at the time of the conference.
- Documentation is sparse and not optimal.

would be reason for improving rather than not using the package.

5 Using it

Simply `\usepackage{bigfoot}` should work for the average case and improve page layout and breaks. If you want to have short footnotes possibly placed inside of a paragraph, use

```
\AtBeginDocument{%
  \RestyleFootnote{default}{para}}
```

You will not likely notice much of a change at first, unless you actually use short footnotes. For long footnotes, paragraph mode is ungainly and thus avoided automatically.