GNU TEXMACS

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1 Statement of the problem

Ordinary users have the choice between several office suits, like Microsoft Office, Open Office, or Star Office, for common desktop tasks, like text editing, drawing pictures or data administration. A major challenge is to provide a similar software for scientists, with more specific support for things like mathematical formulas, complex computations, presentations from a laptop and so on.

2 Importance of the problem

Currently, in the fields of mathematics, physics and computer science, people use different tools for each task. For instance, mathematical texts are usually written with TEX/LATEX, computations are done with numerical computation software or computer algebra systems, and presentations are done using Power Point or directly from a Pdf file.

Several of these tools, and in particular TEX/LATEX, are quite user unfriendly. At any rate, it is not straightforward to combine several tools, like including graphics or computer algebra output in a paper. Moreover, different tools use different data formats, which are often not very compatible. For instance, it remains complicated to simply put a mathematical text on the web (in a non-graphical format), because the "web-standard" MathML for mathematics is still poorly supported.

3 Contribution to the problem

The GNU TEXMACS project (`http://www.texmacs.org`) aims to provide a solution to the above problems. The software includes a user friendly and "wysiwyg"

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mathematical text editor, with a similar typesetting quality as TEX, but not directly based on TEX/LATEX. All TEXMACS documents are structured and can be saved in either TEXMACS, SCHEME or XML format. The structure of the documents can be exploited when editing and new style files can be created by the user. TEXMACS also provides SCHEME as an extension language, which allows the user to create new structured editing features.

TEXMACS admits interfaces with many other systems, like computer algebra systems (AXIOM, MACAULAY 2, MAXIMA, MAPLE, MUPAD, PARI-GP), scientific computation software (GNU OCTAVE and SCILAB), and other programs like GNU R, DR. GEO, QCL, etc. Converters exist for several standard formats, like TEX/LATEX and HTML/MATHML. Recent additions are a presentation mode and a tool for drawing technical pictures.

Another important aspect of TEXMACS is that is *free* software in the sense of the Free Software Foundation. We think that this is particularly important for scientific software, because it allows other scientists to access to the source code, adapt the software to new purposes and freely redistribute the (possibly improved) software to colleagues. In particular, one of the design goals of TEXMACS is to help other scientists who wish to create free academic software by providing a good user interface.

4 Originality of the contribution

The major achievement of GNU TEXMACS is to provide a user friendly and fully integrated software for common mathematical activities. Even though several other programs exist for particular applications, none of them aims the same quality and generality.

For instance, LYX provides another free and user friendly text editor. However, LYX is not wysiwyg and is not much more than a text editor; for instance, it admits no interfaces with computer algebra systems. A more complete software is SCIENTIFIC WORKPLACE. However, this program is not free (and actually very expensive), and therefore not as easily customizable as TEXMACS. Moreover, the text editor again is not wysiwyg.

Similarly, several computer algebra systems integrate simple editors for writing "notebooks". However, these notebooks are quite unsatisfactory from a typographic point of view and they do not provide the full functionality for writing scientific papers. Moreover, the main computer algebra systems MAPLE and MATHEMATICA or not free at all.

5 Non-triviality of the contribution

The main design goal of providing a flexible, structured and integrated editing platform for scientists is also the major difficulty from the implementation point of view. Indeed, our requirements include wysiwygness, scriptability, extensible markup, interactive styling, sufficiently high reactivity, user friendliness, etc.

Although it is not necessarily hard to develop a program which satisfies one, two or three of these requirements, the main point here is to simultaneously fulfill all of them. This required the development of new algorithms and data structures for styling and typesetting, as well as the implementation of a new paradigm for modular programming. Some of the new ideas and techniques are described in the documentation of the source code and [4]. A more complete overview will be written as soon as the implementation of the TeXmacs core will be finished.

References

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