

Introduction to Typesetting with LaTeX

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accompanies the *template_new.tex* file for bachelor/master theses

Motivation

- LaTeX is a typesetting system
- Particularly useful for longer documents (bachelor/ master theses, dissertations, scientific articles)
- Advantages compared to Word
 - high typographic quality
 - excellent support for setting formulas
 - automatic generation of lists (references, figures, tables)
 - simple structuring of documents (no formatting hassles)
 - many (user-written) packages, e.g. for graphs, plots, presentations, ...

Motivation

- LaTeX is used a lot for scientific purposes
- LaTeX is not a WYSIWYG solution!
 - formatting uses commands (similar to a programming language)
 - document is compiled

Contents

- 1. installation & setup
- 2. structure
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1. installation & setup

- LaTeX can be downloaded for free in the form of different distributions for all common operating systems
 - <https://miktex.org>
 - <https://www.tug.org/texlive/>
- installation after download directly (Windows) or with a package manager
- software can compile TeX-documents (for example to a PDF)
- how do I produce a TeX document?

editors

- in principle, TeX documents can be generated in any text editor
- not recommended, becomes messy fast
- there are (free and costly) editors, that support LaTeX or are specifically designed to work with LaTeX
 - editors with LaTeX support
 - <https://www.sublimetext.com>
 - <https://atom.io>
 - <https://code.visualstudio.com>
 - editors especially for LaTeX
 - <http://www.texniccenter.org>
 - <https://www.texstudio.org>
 - <https://www.xm1math.net/texmaker/>

Document classes and the preamble

- there are various document classes
 - article
 - letter
 - book
 - beamer (slides)
- each document class has several adjustable parameters, e.g.
 - `\documentclass[12pt,a4paper]{article}`
- preamble: import of additional packages, e.g. for math (amsmath, amssymb), layout (geometry), language (babel), etc.
 - `\usepackage{geometry}`
 - `\usepackage{graphicx}`

2. structure

- simple structuring of a document
 - chapter, section, subsection, subsubsection, paragraph
 - Automatic (but manually adjustable) numbering
- line breaks are forced with `\\`.
- internal referencing
 - sections can be given names, that can be referenced in the document
 - `\label{ }`
 - references are generated automatically
 - `\ref{ }`
 - works with equations as well (see below)

3. formatting

- commands for formatting
 - font size (relative to parameter given in `\documentclass`)
 - `\huge{}`, `\Large{}`, `\large{}`, `\small{}`
 - font type
 - `\textbf{}`, `\textit{}`, `\underline{}`, `\emph{}`
 - footnotes
 - `\footnote{}`

4. formulas

- a key advantage of LaTeX over Word
 - special environment („math environment“) for typesetting formulas
- in the main text
 - $\$. . . \$$: delimited by Dollar signs
- as a centered equation in separate paragraph
 - `\begin{equation} ... \end{equation}`
 - `\begin{align} ... \end{align}`: for stacking equations
- formatting
 - subscript: `_ { }`
 - superscript: `^ { }`
 - sum, product: `\sum, \prod`
 - fractions: `\frac{ } { }`

5. figures

- the `graphicx` package allows inclusion of figures
 - many formats (jpg, png, pdf)
 - command: `\includegraphics[]{}`
 - the brackets may contain parameters
 - e.g.: `width=3cm`, `width=0.8\textwidth`

- figures can be numbered, receive a caption and be placed in the document inside the `figure`-environment
 - `\begin{figure} ... \end{figure}`
 - in between: `\caption`, `\label` etc.
 - placement: `[h]`, `[t]`, `[b]` (here, top, bottom)

6. tables

- generation of tables in the `tabular`-environment
- table setup
 - `\begin{tabular}{rcccl}...\end{tabular}`
 - `\begin{tabular}{r|ccc|l}... \end{tabular}`
 - „rcccl“ defines the number of columns (5) and their alignment (right, center, center, center, left); | puts a vertical bar between two columns
 - rows are added with new lines broken with `\\`
 - cell entries are separated by `&`
- placement: use the `table`-environment
 - works like the `figure`-environment
- For use, see example `tex`-file and note the use of the `input`-command to avoid messy code in the main document

7. literature

- LaTeX strong point: automatic bibliography with `bibtex`
 - collection of referenced works in `bibtex`-entries in a `.bib`-file
 - citation in the main text with `\cite{}` and similar commands
 - Automatic bibliography by running `bibtex` before compiling with `pdflatex`
 - command sequence
 - `bibtex`: reads the entries from the `.bib`-file
 - `pdflatex`: run twice! First round compiles the document, second round updates the references

Bibliography

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