LaTeX for Economics and Business Administration

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Introduction

Why this workshop?

- In the *social sciences* few attention to what tools to use (and why)

- LaTeX is very much used in the scientific world and *works* brilliantly together with
  - statistical packages, such as `Stata` and `R`,
  - markdown/HTML,
  - reference managers.

- Why *I* want to give this workshop
  - intrinsic interest
  - my goal: pre-conferences workshops / courses

What I want (and don't want) with this workshop

- Give a general introduction of why some tools work together

  - LaTeX
  - reference managers
  - (statistical) output

- Give an introduction to LaTeX

  - First the basics + using references
  - Next workshop: some advanced stuff

- What *I* do not want

  - Tell you what applications to use (**you** need to decide and make a **well-informed** decision)

Background

- T_EX has been devised by Donald E. Knuth in the late 70's
- LaTeX is a set of macro's around TeX and devised in the 80's
- LaTeX is a *typesetting program*, not a *Word processor*
    - It is actually some code that needs to be compiled
    - Code is typed in by an editor
- So,
    - Huge differences between Word and LaTeX
    - for LaTeX you need an editor:
        - Specific editors: TexStudio, TexShop, RStudio
        - General editors: Sublime, TextMate, Atom, Vim, Emacs

Disadvantages

- Not WYSIWYG
- You nead to learn (quite) some commands
  - Learning curve, but
  - hurray for cheat sheets and Google
- Difficult to cooperate with people from the *dark side*
- *Basic* LATEX has *difficulties* with incorporating new fonts (Hoefler, minion pro)
  - XeTeX
  - For the purists: LATEX does it right (LATEX vs Word)
- Difficult to create unstructured and ugly documents

Advantages

- Free (as in beer) and ubiquitous
- WYSIWYM
- Consistent lay-out throughout the whole document (including tables, appendices, formulas, source code, etc)
- Internal references are a breeze (references, ToC, ToT . . .)
- Forced to structure documents
- Macros, thus scriptable
- Large community, thus a package for almost everything (books, articles, presentation, posters, exams, musicscores)
- Superior typography & output
- Many free LaTeX templates

LATEX versus Markdown

- Markdown (all variants): lightweight markup language that can export to .doc, .html, and .pdf.

- Much easier then LATEX but less flexible

- Used by writers/blogs even for complete websites

- But good interaction with LATEX; if not only for formula's

How does LaTeX work in practice?

- You edit a `.tex` file without thinking about how it looks
    - distraction free writing (yeah right)

- You then compile it
    - LaTeX is unforgiving: if there is an error, usually it does not compile
    - Typically, errors are missing brackets or parentheses.

- Typically, source `.tex` file is compiled into `.pdf`
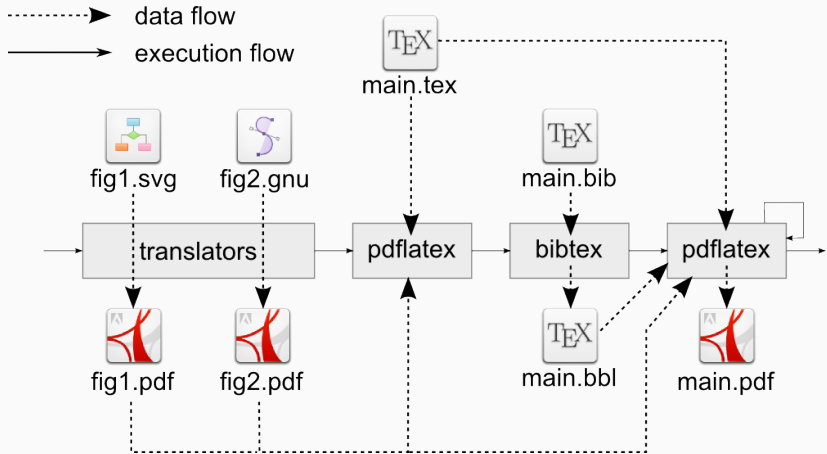
Figure 1: Process diagram

Code, documentation and output

1. Synonyms
2. All based on `.txt` files
3. Encompasses almost anything
    - data itself (`.csv`, `.txt`)
    - set of commands for data cleaning and statistical analysis (`.do`, `.R`)
    - database with references (`.bib`)
    - text for articles, presentations or websites (`.tex`, `.html`)
4. Only output is displayed/interpreted differently (e.g., in a browser or pdf viewer)

Folder structure of your new project (theses, paper, assignment & research)

- Think *a priori* about project set-up
    - Seperate analysis, data and output files
- Be careful with source data!
    - Seperate source and derived data files
    - Typically
        - you get/collect data
        - transform data
        - analyse data
    - Keep track of all these stages!

TeXstudio

TeXstudio: A quick tour

- Preferences

- Keyboard shortcuts

- LaTeX dropdown menu

Exercises

First: organize!

1. Create a specific workshop folder somewhere where you can find it.

2. Think about versioning system and a back-up system

3. E.g.: use dropbox and/or Time Machine

Exercise 1: Open from template and fill in!

```latex
\documentclass[]{article}
%opening
\title{}
\author{}

\begin{document}

\maketitle

\begin{abstract}

\end{abstract}

\section{}

\end{document}
```

OK; and now what?

1. Save your file in your folder (give is an appropriate name)

2. Press F1 (or F5)

3. The editor now sends LaTeX the message that it should *compile* your file

4. LaTeX creates many new files

Exercise 2: Create a paper structure

```latex
\section{}
\subsection{}
\subsubsection{}

```

Note that the following are used for books

```latex
\part{}
\chapter{}
```

And for bigger projects:

```latex
\include{}
\input{}
```

Intermezzo: preamble

Part before \begin document is called preamble

```
1  \documentclass[]{article}
2
3  % This is where packages are loaded
4  % and specific commands are given that
5  % determine how the lay-out and desing
6  % of your document will look like
7  % including: references, tables,
8  % paragraphs, headers, etc.
9
10 \begin{document}
```

Intermezzo: white spaces and special characters

An empty line starts a new paragraph and consecutive white spaces are treated as one

```
1  One paragraph
2
3  Second      paragraph (just one white space)
```

The following characters are reserved # $ % &̂ _ { } ˜ \ and should be used as follows

```
1  \# \$ \% \^ \& \_ \{ \} \~{}
2  \textbackslash{}
```

So, with a backslash before except for the backslash (does this make sense?)

Exercise 3: Create a table of contents

More complex text structures are relatively easy, just insert (after `\begin document`)

```
1  \tableofcontents
2  \listoffigures
3  \listoftables
```

Lists

- Itemization

```
1  \begin{itemize}
2          \item blue
3          \item red
4  \end{itemize}
```

- Enumeration

```
1  \begin{enumerate}
2          \item first item
3          \item second item
4  \end{enumerate}
```

Exercise 4: Lists

Create the following mode choice list in your `.tex` document

1. Cycling
2. Walking
3. Driving
4. Public transport
   - Bus
   - Tram
   - Metro
   - Train

Further text control

- Bold

```
1 \textbf{bold}
```

- Emphasize

```
1 \textit{italics} or \emph{emphasized}
```

Formula's

Inline math `$ $`; displayed math `$$ $$`; for example:

```
1  $x^2$
2  $x_2$
3  $\sqrt{x}$
4  $$Y = K^\alpha L^{1-\alpha}$$
5  $$\sum_{i=1}^I$$
6  $$\frac{\partial x}{\partial y}$$
7  \begin{equation}
8          E = mc^2
9  \end{equation}
```

Exercise 5: Create these formula's

1. Regression formula:

$$y_i = \alpha + \beta x_i + \epsilon_i$$

2. The mean

$$\bar{x} = \frac{1}{N} \sum_{i=1}^{N} x_i$$

3. Optimal economic order quantity:

$$Q^* = \sqrt{\frac{2DK}{h}}$$

Figures

Figures/graphs and tables in a floating environment

```latex
\begin{figure}[h!]}
\center
        \includegraphics{ligatures_latex}
        \caption{A figures about ligatures}
        \label{fig:ligatures}
\end{figure}
```

Figures can be .pdf, .jpg, .png and a whole lot of other types (but not bitmaps!)

Tables

```latex
\begin{table}[t!]
        \caption{This is the caption}
        \begin{tabular}{|l|c|r|}
                \hline
                first & row & data \\
                second & row & data \\
                \hline
        \end{tabular}
        \label{tab:example}
\end{table}
```

Internal references are a breeze

```
1  \label{}       % Label something
2  \ref{}         % Refer to that
3  \footnote{}       % Add footnote
4  \thanks{}        % For in title
```

Exercise 6: Create a table

Create the following table

Table 1: Average grades

First name	Surname	Grade
Sherlock	Holmes	7.9
John H.	Watson	8.1

And refer to it in text as such:

Table 1 gives the average grades for course solving crimes.

Literature references (at the end)

```
1  \cite{} % cite something
2  % Now tell LaTeX where to find references
3  \bibliography{references.bib}
4  % and which citation style to use
5  \bibliographystyle{apalike}
```

Later, we dive into how to make this look good

Exercise 7: References

1. Search on Google Scholar for three references from Erik Verhoef and/or Wout Dullaert

2. Put those in a `.bib` file in the **same** directory as your `.tex` file

3. Refer to those in your `.tex` file

4. Create the reference list

Conclusion

Next workshop

- Use of packages

- Making things look better!

- Graphs

- Better tables with `Stata` and `R` output

- Slides