

L^AT_EX and Sweave without Tears

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The Pain of Using L^AT_EX, R and Sweave That
You Dare Not Tell Others Which Is Similar to
The Feeling When We Are Forbidden to
Interpret Frequentist Confidence Intervals in A
Natural Way, and How to Alleviate This Pain
with L_YX

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The Unbeatable \LaTeX

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\LaTeX

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- really beautiful and high-quality output (how was \TeX invented? how many bugs have been found in \TeX ?)
- a \LaTeX document is usually highly organized and the structure can be fairly compact (so users can hardly do “dirty” things)
- focus on writing instead of typesetting (because they are independent)
- infinite extensions...
- search for “Zombie Andrew Gelman” in Google and read section 4
- so experts recommend \LaTeX to us, and we begin to learn

But...

Theorem 1

The King has no clothes.

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But...

Theorem 1

The King has no clothes.

Proof.

Do we need to prove? OK. Do you call a document like this “dressed”? `\documentclass{article} \begin{document} \end{document} ...` □



What's wrong to be naked?

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- it is illegal to be naked in public by Iowa law¹

¹I saw this in Jimmy John's – not sure if it is a joke 

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- it is illegal to be naked in public by Iowa law¹
- error-prone!!
- time-consuming!!!
- evidence? Plenty of! Dr Nettleton's 511, Dr Kaiser's 601...

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A hard-working student

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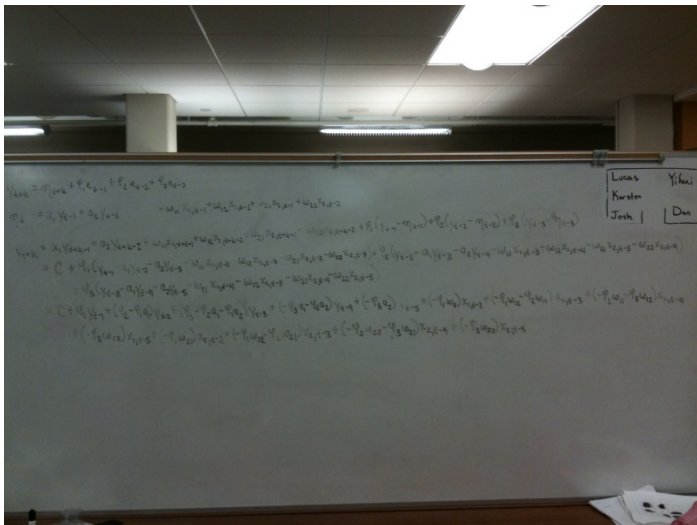
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So you start thinking...

- a little voice whispering in your mind:

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Explanation of the stupid long title

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- we feel natural to interpret a Frequentist CI as “the probability for the parameter to fall into *this* CI is 95%”
- we still wish we could do this, although they (professors) yelled at us not to be stupid
- we feel natural to write an article in a way that we can see it (as least roughly)
- but we see code, the all-mighty code, the glorious code, the you-name-it code...

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- we begin to miss the lovely and cute Microsoft Word, but WAIT!

Introduction

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Theorem 2

We don't need to introduce LyX to experienced L^AT_EX users.

Proof.

LyX $\xrightarrow{\text{a.e.}}$ L^AT_EX (we can export a LyX document to various formats) □

Another introduction

Fact 3

$LyX \neq Microsoft Word$

Comments

This means you must not worry about your styles. Focus on writing what you intended to write! Don't waste time on choosing **bold** or *italic* fonts or font size 10/12 or styles for Headings...

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How much do you know about L^AT_EX?

I recommend LyX to experienced L^AT_EX users only, because they usually appreciate the compactness of code. Make sure you can write a minimal L^AT_EX document without looking at any references, otherwise the above Fact might not be true.

The real introduction

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- LyX is free software and works on various platforms
- relies on a working L^AT_EX toolkit (e.g. T_EXLive under Linux, or MikT_EX under Windows) since it is only a GUI front-end
- semi-WYSIWYG but that's enough
- lots of “automatic” features, e.g. special characters, math symbols auto-completion, automatically load relevant L^AT_EX packages, can specify settings in a GUI, you can see references, automatically update labels, run pdf_latex twice if needed, automatically deal with images of various formats (GIF, JPEG, ...)...
- can write papers, books, slides...
- bottom line: if you really don't know how to do something in LyX, you can input the raw T_EX code in LyX (Ctrl + L)

Sweave as they introduced

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- embed R code into a L^AT_EX document (as an Rnw document)
- run R first to generate the real L^AT_EX document (with R output included)
- compile to PDF
- everything in one document – generally we can reproduce a paper because the computation is transparent (so are the tools: they are free and open source)

An example

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- see ?Sweave
- a lot of options available
- two major issues for me:
 - graphics not satisfactory (control the size of a figure: `\setkeys{Gin}{width=0.8\textwidth}`; inconsistent fonts)
 - formatting the R code (either remove comments in code, or ask you to be responsible for the formatting: `keep.source = TRUE/FALSE`), so I provided a solution

pgfSweave for picky users

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- produce graphics in the pgf format (I don't really know much about it)
- pgf graphics is essentially L^AT_EX code to reproduce the graphs
- this makes the quality of graphics unbeatable (can even use raw L^AT_EX code in plots, e.g. as titles)
- natural to specify heights/widths of plots
- caching: built upon cacheSweave (cache for R objects), and supports caching for graphics too!

Connection between LyX and R

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- open source software packages are often friends with each other
- LyX has left a door open for other programs: converters
- embrace command lines!
- fortunately R can be run via command line as well (PATH for Windows users... `R -e an.expression`)

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- embrace command lines!
- fortunately R can be run via command line as well (PATH for Windows users... `R -e an.expression`)
- so they said, “I see you”, as in Avatar
- the real background: literate programming (supported in LyX); LyX → Sweave (`.Rnw`) → L^AT_EX (`.tex`) → PDF

The gory configuration

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- although pgfSweave and LyX are very handy tools, it is not a trivial task to configure them to work together
- I spent several hours trying to automate this process:
- <http://yihui.name/en/2010/10/how-to-start-using-pgfsweave-in-lyx-in-one-minute>

Evidence

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- I'm not a liar – I've been doing homework with LyX and (pgf)Sweave
- demo time!

Thank you!

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- any questions, comments and *jokes* are welcome
- for more stories, drop by Snedecor 2215