

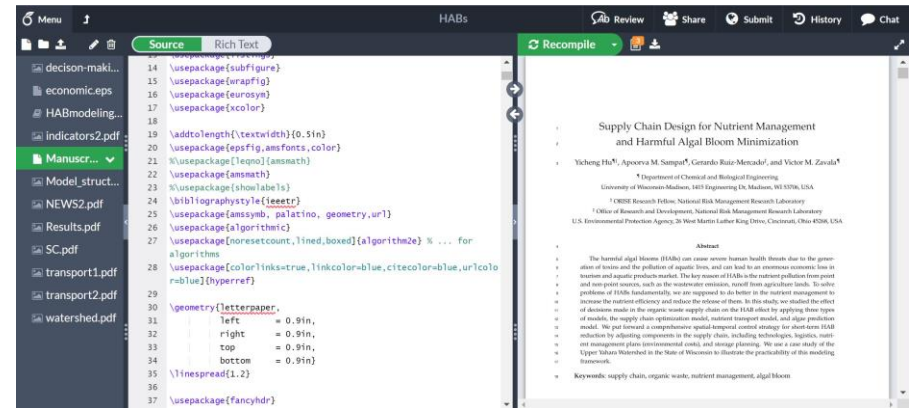


A Tutorial on L^AT_EX

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Zavala Group
09/21/2018

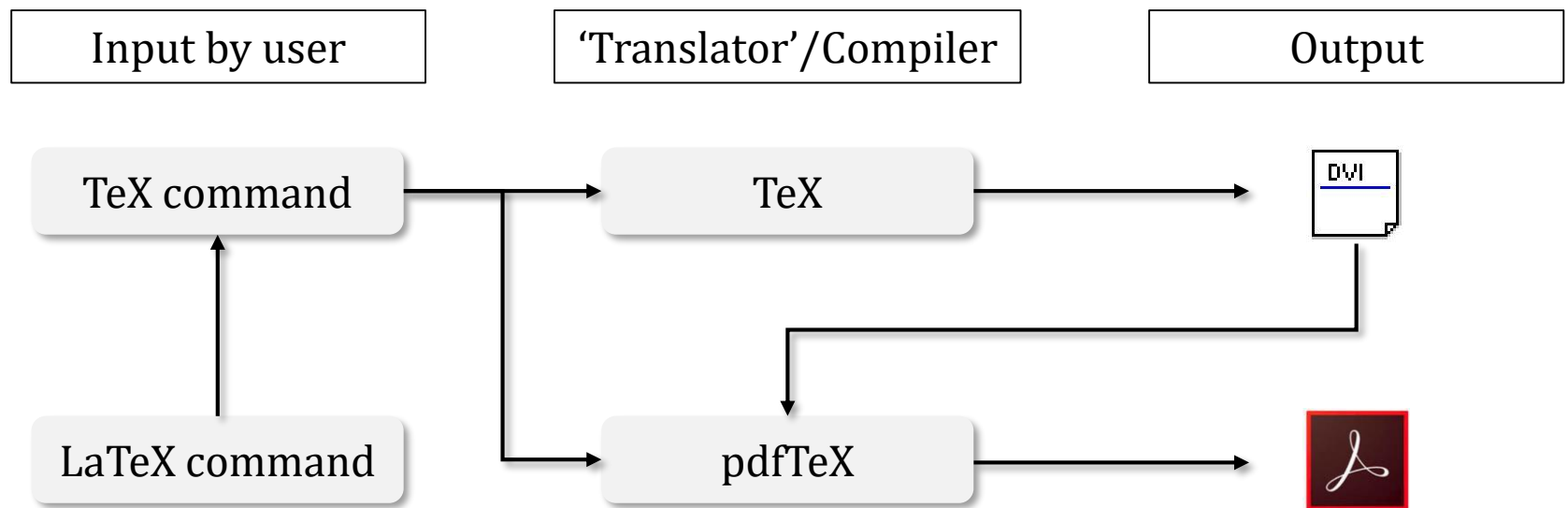
Outline

- What is LaTeX?
- Why LaTeX?
- How to use LaTeX?
 - LaTeX editors: online and local
 - Overview
 - Techniques for page setup, figures, equations, etc.
 - Resources and other remarks



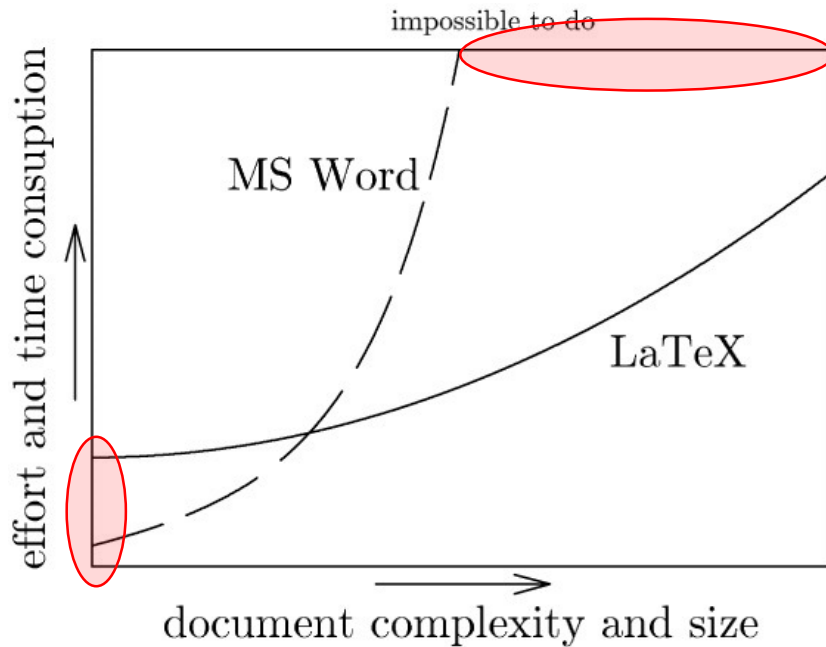
What is L^AT_EX? *'Lay-Tech'*

- Lamport TeX
- high-quality document preparation system based on TeX
- designed for the production of technical and scientific documentation
- LaTeX: not WYSIWYG



Why L^AT_EX?

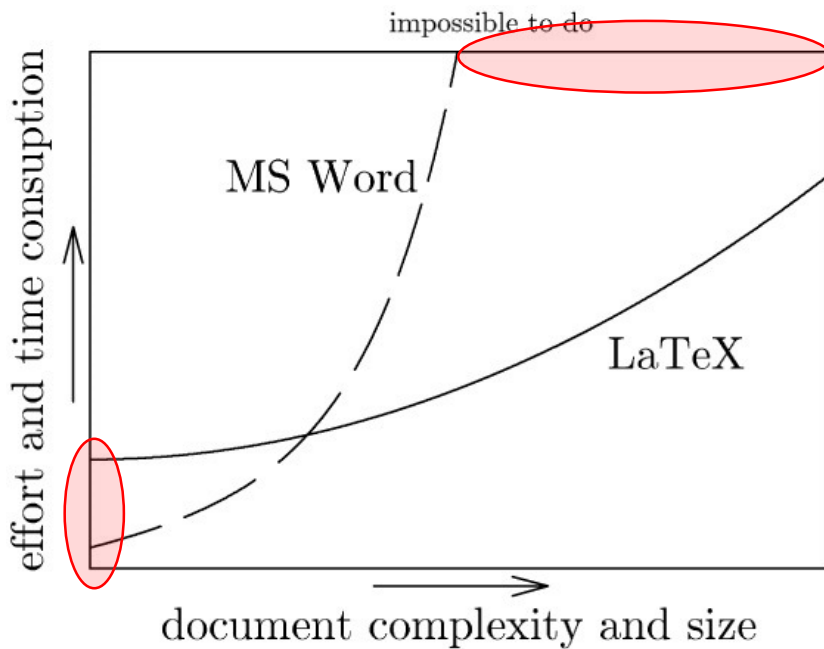
- Learning Curves of LaTeX and MS Word



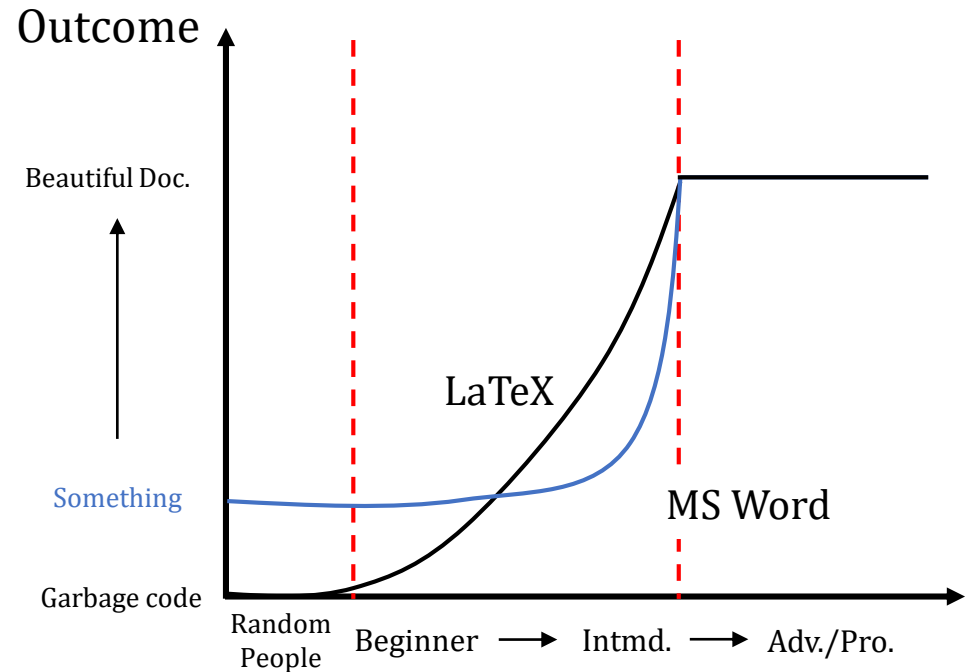
Bhatnagar (2013)

Why L^AT_EX?

- Learning Curves of LaTeX and MS Word



Bhatnagar (2013)



Learning Stage

My Understanding

Why L^AT_EX?

- Great for typesetting math

$$\mathcal{L}^{-1} \{ \hat{f}(s) \hat{g}(s) \} = \int_0^t g(t - \tau) f(\tau) d\tau$$

Why L^AT_EX?

- Great for typesetting math
- Automated placement of tables and figures

3 Case Study

In this section, we introduce the practicability of the modeling framework by using a case study in the State of Wisconsin (WI). Data collection, a description of different scenarios and the results are also presented.

3.1 Study Region

We choose the Upper Yahara Watershed (Lake Mendota basin) as the study region. The map in figure 4 shows the geographical location and boundary of the study region, and also the density of agriculture nodes (farms and croplands), which represents the agricultural activity intensity.

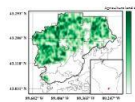


Figure 4: Upper Yahara Watershed

This region has a significant nutrient pollution mainly due to high intensity agricultural activities and increasing population. We define the nutrient balance index (NBI) as the ratio of nutrient applied to land over nutrient that is removed by crops. Obviously, when NBI is larger than 1, the nutrient

<https://www.lake.umn.edu/>

will accumulate in the region and will cause nutrient pollution, while when NBI is smaller than 1, it indicates that the overall soil fertility may be declining, and therefore is not sustainable in the long run. The NBI value for phosphorus has been evaluated for the study region in the year 2012 and 2013, which is 1.01 and 1.03 respectively [26]. We estimated that the NBI value for the year 2017 reached 1.46. In addition, according to the statistics from the U.S. Decennial Census, the population in the City of Madison continues to grow from the 1990s at the increasing rate of 10% per decade. The increasing population can cause more intense human activity and the generation of more organic waste. Therefore, we can conclude that there exists severe nutrient accumulation in the study region in recent years.

The excess nutrients in the study region can result in inferior water qualities. The Wisconsin Department of Natural Resources publishes water quality reports for Lake Mendota since 1989.³ The reported TSS value fluctuates between 50 and 60, indicating the lake is defined as eutrophic and there could be potential HAB risks. The UW Madison Center for Limnology also publishes news of HABs in Lake Mendota in recent years.⁴

3.2 Model Settings and Data Collection

The modeling framework requires different types of information at each stage. In this part, we discuss the settings and data input for each model. The data and code are available online in GitHub.



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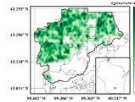


Figure 4: Upper Yahara Watershed

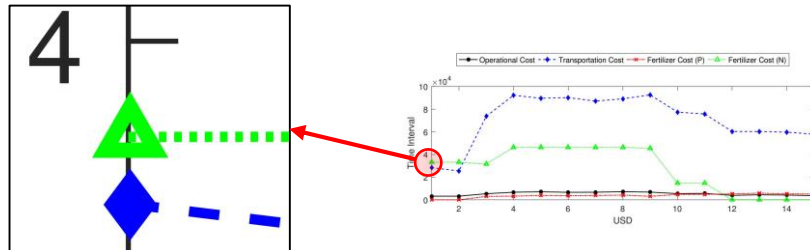
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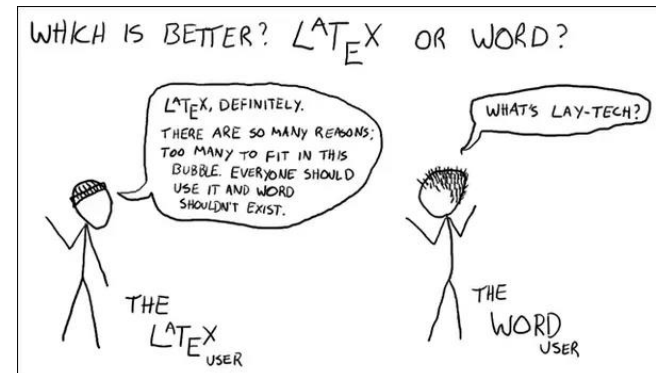
- Great for typesetting math
- Automated placement of tables and figures
- Support vector graphs: .eps, .pdf



Why L^AT_EX?

```
!"#$%&'()*+,-./  
0123456789:;<=>?  
@ABCDEFGHIJKLMNO  
PQRSTUVWXYZ[\]^_  
`abcdefghijklmno  
pqrstuvwxyz{|}~
```

- Free and universal (ASCII)
- Separating content and layout
- Pretending to be a theoretical scientist



L^AT_EX editors

- Online: Overleaf, ShareLaTeX: combined to **OverLeaf 2**
- <https://v2.overleaf.com> we will use this
- <https://www.sharelatex.com> many tutorials here

- Local: TeXworks (TeXlive), TeXStudio, CTeX

- Some plug-in:
- e.g. IguanaTeX in Windows PPT, similar one in IOS

Overview

- Two basic commands:

1. `\somecommand[optional arg]{argument}`

2. `\begin{someenvironment}`

.....

`\end{someenvironment}`

Overview

```
\documentclass[...]{articles}
```

```
\usepackage{xxx}
```

```
\usepackage{yyy}
```

```
...
```

```
% some global settings
```

```
\pagestyle{...}
```

```
\geometry{...}
```

```
\bibliographystyle{...}
```

```
% some new command
```

```
...
```

```
\begin{document}
```

```
\section{}
```

```
%content
```

```
\subsection{}
```

```
%content
```

```
\bibliography{ref_file}
```

```
\end{document}
```



Usually offered by template
Add extra packages yourself



Customize part (optional)



Enter your content here

Resources

- ShareLaTeX & Overleaf: a mass of templates
 - Wiki: if you want to learn systematically
 - Google: what I usually do
-
- Once you stick to LaTeX for one month, you will be used to it!

Tutorial on basic techniques

- <http://zavalab.engr.wisc.edu>
- - Teaching
- - CBE 970 Systems Seminar Fall 2018-Spring 2019
- - LaTeX Tutorial

- <https://v2.overleaf.com>
- - Login/register
- - New project
- - Unzip and upload files