

Academic Writing Course Notes

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Tuesday, January 24

1 \LaTeX

1.1 What's \TeX and \LaTeX ?

\TeX is a computer program created by Donald E. Knuth. It is aimed at typesetting text and mathematical formulae.

\LaTeX is a document preparation system for high-quality typesetting.

A few advantages of \LaTeX over WYSIWYG editors, e.g. MS Word:

- Achieve high quality layout with a few easy-to-understand commands that specify logical structure of the document.
- Convenient typesetting of mathematical formulae.
- \TeX is highly portable and free.

\LaTeX is widely used in academia (mathematics, statistics, computer science, engineering, physics, economics, chemistry, etc).

2 General tips

Some useful tools:

- [Detexify](#) for looking up characters for \LaTeX .
- [Sharelatex.com](#), [overleaf.com](#) for easier online collaboration.
- [Grammarly](#) for fast simple checks.
- Thesauri for synonyms, antonyms (e.g. [www.thesaurus.com](#))
- [Academic phrasebank](#)

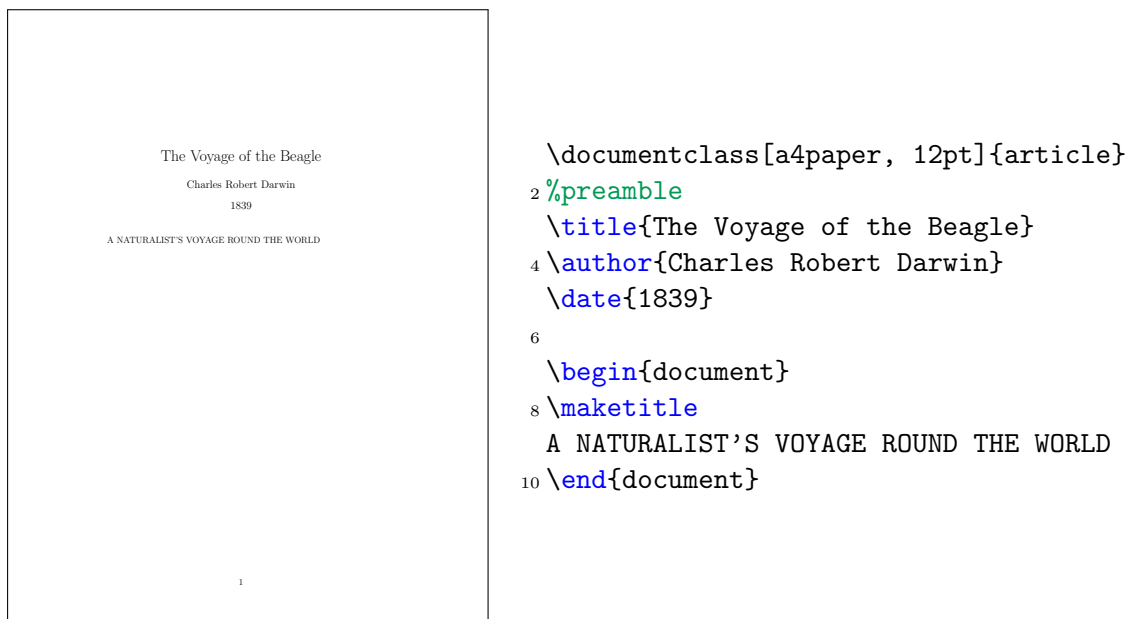
3 Practice \LaTeX

3.1 Installation

You can find installation guide for your operating system here: [www.latex-project.org](#). Remember that it is also possible to use online \LaTeX editors, e.g. Papeeria, Overleaf, ShareLaTeX.

3.2 Creating sample document

Go to the L^AT_EX editor of your choice and type in the following sample structure:



3.3 A few simple tips to not ruin your writing

More can be found in Mathematical Thinking course [lecture notes](#).

Symbols in different formulas must be separated by words.

Bad: Consider S_q , $q < p$.

Good: Consider S_q , where $q < p$.

Do not start a sentence with a symbol.

Bad: $x_n - a$ has n distinct zeroes.

Good: The polynomial $x_n - a$ has n distinct zeroes.

The statement just preceding a theorem, algorithm, etc., should be a complete sentence or should end with a colon.

Bad: We now have the following

Theorem. $H(x)$ is continuous.

Good: We can now prove the following result.

Theorem. The function $H(x)$ defined in (5) is continuous.

Avoid passive voice by using the word “we”.

Avoid unnecessary words and try to keep sentences shorter.

Do not omit “that” when it helps the reader to parse the sentence (also, don't use “which” when “that” sounds better).

Bad: Assume A is a group.

Good: Assume that A is a group.

Do not use the same notation for two different things. Conversely, use consistent notation for the same thing when it appears in several places.

Resist the temptation to use long strings of nouns as adjectives:

Consider the *packet switched data communication network protocol problem*.

Some handy maxims¹:

Watch out for prepositions that sentences end with.

When dangling, consider your participles.

About them sentence fragments.

Make each pronoun agree with their antecedent.

Do not use commas, which are not necessary.

Try to never split infinitives.

Dangling participle:

Bad: Born in Russia, his most famous opera is

Good: Sleeping in mine orchard, a serpent stung me. (Hamlet)

Sentences should be readable from left to right without ambiguity.

Bad example: “In microbiology, microscopic organisms, such as bacteria, viruses, archaea, fungi and protozoa, are studied.”

Better: “Microbiology studies microscopic organisms, such as bacteria, viruses, archaea, fungi and protozoa.”

Vary the sentence structure and the choice of words, to avoid monotony. But use parallelism when parallel concepts are being discussed. Example:

Formerly, science was taught by the textbook method, while now the laboratory method is employed.

Formerly, science was taught by the textbook method; now it is taught by the laboratory method.

Tie the concepts (e.g. formulae, definitions) together with a running commentary.

Perhaps the most important principle of good writing is to keep the reader uppermost in mind: What does the reader know so far? What does the reader expect next and why?

3.4 Plotting figures

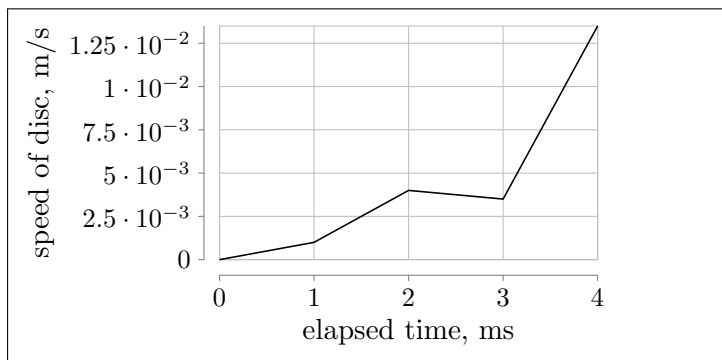
Using TikZ package to plot figures².

Examples can be found at www.texample.net/tikz/examples

Open you L^AT_EX editor and type the following code for a sample figure into the `document` environment, i.e. between `\begin{document}` and `\end{document}`:

¹Maxim is a short, pithy statement expressing a general truth or rule of conduct. ”The maxim that actions speak louder than words.”

²You can browse this [tutorial](#) for more information.



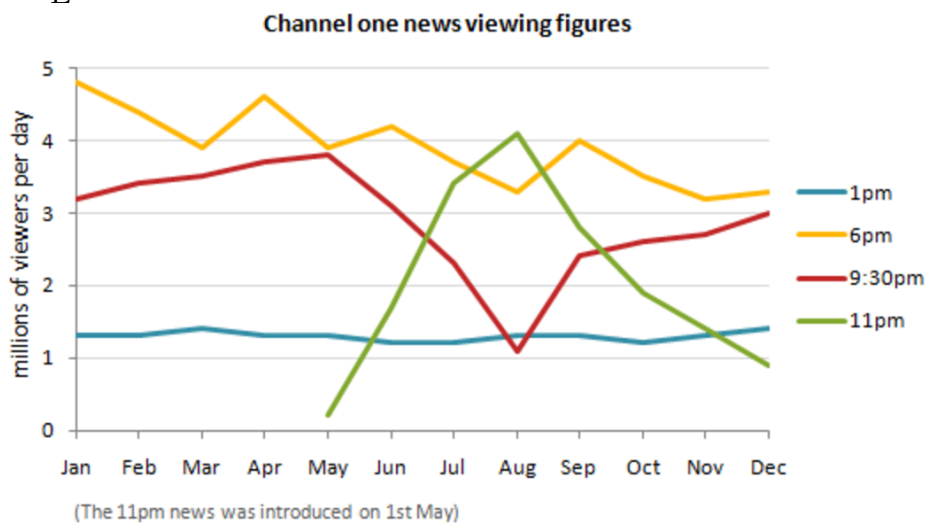
```

\begin{tikzpicture}
2 \datavisualization[
    scientific axes=clean,
4    x axis={attribute=time,
        label={elapsed time, ms}},
6    y axis={attribute=v,
        label={speed of disc, m/s}},
8    all axes=grid,
        visualize as line]
10 data {
    time, v
12    0, 0
        1, 0.001
14    2, 0.004
        3, 0.0035
16    4, 0.0135
    };
18 \end{tikzpicture}

```

3.5 Figure description

Using appropriate vocabulary to describe figure below. Home assignment: plot the figure with L^AT_EX:



Now, either describe the figure from scratch or just fill-in the text below (available options are: **steadily**, **hovering**, **trend**, **meanwhile**, **rocketed**, **fluctuated**, **peak**, **plummeted**, **period**):

The chart shows the average daily viewing figures for Channel One News over a 12-month The figure for the 1pm News remained fairly stable, at around 1.3 million throughout the year. The figure for the 6pm News began the year at 4.8 million. It, but the general was downwards, and it ended the year at 3.4 million.

The figure for the 9:30 News gradually increased from 3.2 million viewers per day in January to a of 3.8 million in May. However, this month saw the introduction of the 11pm News, and the figure for the 9:30 News, hitting a low-point of 1.1 million in August. In the same period, the figure for the 11pm news from 0.2 million to 4.1 million. At this point, the trend reversed. From

August onwards, the figure for the 9:30 news grew, reaching 3 million by the end of the year., the figure for the 11pm News declined sharply, and in December fell below the 1 million mark.

4 Home assignment

4.1 Plotting

Plot the figure from Section 3.5 using TikZ package.

4.2 Problem Statement

Write ~200 words description of your current research problem in L^AT_EX.

Friday, January 27

5 Scientific paper/thesis writing tips

5.1 Seven simple suggestions by Simon Peyton Jones

What follows is mostly applicable to a conference paper, however, some advices are not limited to a particular type of work. Check out the video of the lecture [here](#).

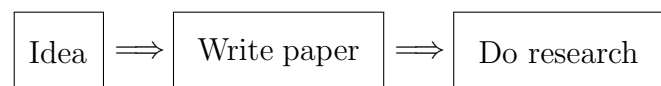
Writing papers

is a primary mechanism for *doing* research, not only reporting/communicating it.

Concepts and ideas are organized clearer when we write.

Ideas are not always fantastic; write anyway.

Writing is a way of *developing* the idea. It lets you grow the seed-thought into a beautiful flower.



Key idea

is useful and reusable. Convey it so that your readers minds are “infected” by it - they talk about it and spread it to others. This makes paper a mechanism for conveying the ideas, failing to do this properly kills the idea (no matter how brilliant it is).

One paper - one clear, sharp idea.

When you start it may be hard to articulate the key idea. By the time you finish the paper make sure the reader can clearly understand the bottom line of the paper. If you address several ideas, write several papers!

Distill the idea.

Make it clear: “The main idea of the article is...” “In this section we present the main contributions of the paper.”

Tell a story

in an accessible and engaging way.

A sample narrative flow can be as follows:

- Here is a problem

Machine translation (MT) is hard. Translation deals with natural language which is incredibly reach ...

- It’s an interesting problem

Wouldn’t it be nice to have conversations with foreign people without knowing the language? ...

- It’s an unsolved one

So far translation systems have been on a very primitive level. ...

- Here is my idea
Let's use this approach to MT. ...
- And it works! (details, data)
I tested my model and got such and such results. ...
- Here's how my idea compares to other approaches
A seminal paper on MT is by Green et al. [1]. It lays the foundation for the work I have done. ... Blue et al. [2] use very similar approach, however ...

Telling a story is a way to lead the readers into further reading. Most of the people won't read the whole thing, but you should lure them into it.

Suggested structure:

1. Abstract (4 sentences, 1000 readers)
2. Introduction (1 page, 100 readers)
3. The problem (1 page, 10 readers)
4. My idea (2 page, 10 readers)
5. The details (5 pages, 3 readers)
6. Related work (1-2 pages, 10 readers)
7. Conclusions and further work (half a page)

Introduction: describe the problem briefly...

Don't give general and obvious descriptions (universal truths), they are boring. Give an instance of the problem to introduce it³. [example 1](#) [example 2](#)

...and state your contributions.

Write your first draft of contributions early. It drives your paper and research. Once more, be clear: a good thing is to represent your claims as a bulleted list. If the claim failed to be substantiated, simply update the draft with another.

One bullet - one claim.

One claim - one forward-reference to the evidence, e.g. section in the paper⁴. This adds structure and easy navigation across the paper.

Refutable claims

Describe contributions as 'not easy'. Use actions that might have failed.

Unnecessary stuff

Avoid "the rest of the paper is structure as follows..." part. Do you ever read it yourself? The structure is given by the forward-references already!

Example 1 from [Mikolov, 2013]:

³Another hint: in computer science it is often done with a help of a figure.

⁴Evidence may be analyses, arguments, measurements, theorems, etc.

In this paper we present several extensions of the original Skip-gram model. . . .

First **we identify** a large number of phrases using a data-driven approach, and then **we treat** the phrases as individual tokens during the training. To evaluate the quality of the phrase vectors, **we developed** a test set of analogical reasoning tasks that contains both words and phrases.

Example 2 from [Lu and Xiong, 2016]:

Overall, the main contributions of this paper are:

- We introduce an adaptive encoder-decoder framework that automatically decides when to look at the image and when to rely on the language model to generate the next word.
- We first propose a new spatial attention model, and then build on it to design our novel adaptive attention model with “visual sentinel”.
- Our model significantly outperforms other state-of-the-art methods on COCO and Flickr30k.
- We perform an extensive analysis of our adaptive attention model, including visual grounding probabilities of words and weakly supervised localization of generated attention maps.

Related work

often forms a barrier between your reader and your idea.

First, keep in mind that you want to bring as many readers as possible into learning about your awesome idea. Most of them would be from a broader field having little knowledge of the notational setup, specifics, intuitions, etc. Because of this lack in background, it would be hard for them to thoroughly comprehend the related work section right after introduction.

On the one hand, you could make related work very short and dense, so it would be easy to skip for such readers. This approach, however, only scares off the potential reader.

Alternatively, you can try and build the basics useful to understand ideas from the related work. This only stretches out the section; thereby building a barrier for the potential readers.

Also preceding your idea with related work does not allow for any effective comparison. The reader is not familiar with your solution to the problem.

The suggestion is to put the related work part just before the end of the paper, i.e. conclusions and further work. [example 1](#) [example 2](#) [example 3](#) [example 4](#)

Other tips: give credit when its due, be generous to competition, acknowledge weaknesses.

Readers first

Make following your ideas easy!

Intuition first

Explain the intuition behind the arguments, only then dive into details. Otherwise, lost in notation and specifics, they feel stupid. Treat readers as your friends. Think of how you explained your research to your close friend/relative? Examples!

Choose the most direct route to the idea.

Test the paper

on your friends.

Is it easy to follow/understand?

Non-experts are also precious since you want to make the paper accessible and engaging! Consider rewriting ‘I got lost here’ parts. Learn how to explain things better.

Ask for reviews.

Do not be afraid to receive criticism from experts. If the idea is a rubbish, better find it sooner than later.

5.2 Some notes regarding thesis writing

Look at [The Researchers Bible](#) (How to survive a PhD) by Alan Bundy et al. for more.

Keep working papers and notes as you do your research.

Some of them can become a publication (journal or conference paper). Collect them into a single folder called “thesis”. By the time you start building up the text of the thesis, you will have a material to start working bottom-up: putting together different aspects of your work together.

Build thesis ‘message’.

- short (abstract length)
- each sentence is a step of an argument. The argument is the message.
- each sentence also aligns with some chapter (outlines its content).
- the message is a guide to your thesis.

Forming a message ensures your thesis is a single coherent piece of work. Also, it helps you understand what should be highlighted in your work. This kind of writing can be called top-down, as you first consider high-level view of the thesis.

Example:

“The Computational Modelling of Religious Concepts”

by

Fr. Aloysius Hacker

1. We apply ideas from Computer Science to the understanding of religious concepts.
2. Previous attempts to explain religious concepts, e.g. the holy trinity and miracles, have often encountered philosophical problems.
3. These problems arose because the appropriate terminology was not available. Computational terminology often provides an appropriate analogy.
4. Although some problems still remain, e.g. free will,
5. We are seeing the beginning of a new, computational theology.

References

- [A not so short guide to L^AT_EX](#)
- [TikZ manual](#)
- [brief L^AT_EX tutorial](#)
- [The Researchers Bible](#) (How to survive a PhD) by Alan Bundy et al.
- [video](#) lecture on How to Write a Great Research Paper.
- Mathematical thinking [course lecture notes](#), taught by Donal Knuth at Standord.
- [A Brief Guide to Writing a Thesis](#) by David Vernon.