

CS190 Latex Exercise

Due September 23rd

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Abstract

Your mission, whether or not you choose to accept it,¹ is to reproduce this document. Please change the name and email above, but otherwise reproduce this document *exactly*.

Please don't hesitate to search the internet for advice on L^AT_EX typesetting. Everyone does it—even the experts.

1 Introduction

”Outside of a dog, a book is a man’s best friend. Inside of a dog it’s too dark to read.”

—Groucho Marx

Over the course of human history, people have opened papers with broad generalizations and irrelevant quotes. Don't do it. Even if your topic doesn't involve the entire sweep of life as it evolved on Earth, you may have worthwhile things to say. Say what you want to with *economy* and *relevance*. Set scene for your reader—the context in which you're thinking and what they² should expect—and then get on with it. For more advice on writing, I strongly recommend two books: *The Sense of Style* by Pinker [2014] and *Style: 10 Lessons in Clarity and Grace* by Williams and Bizup [2013]. (**NB** you should use `bibtex` for these citations—do not write them in manually. I recommend the `natbib` package.)

2 More detailed motivation

CS papers will typically only give brief, general examples in the introduction; the second section tends to offer more detailed motivation. Arranging a paper from general to specific is a kindness to the reader. Not only is diving into details disorienting, but starting from a broad perspective allows the reader to ask themselves: is this something I want to read? is it about what I *think* it's about?

Some papers work differently: when discussing a dense area of study, the second section is sometimes devoted to related work. It's often important to clarify how your ideas are slightly different than what already exists in the literature or to expose a gap in what's been discovered so far.

3 Technical stuff

No matter what field a CS research paper is in, eventually the time comes for technical material. PL folks might define a syntax (below) and semantics (Figure 1):

Values	$v ::= \text{herp} \mid \text{derp} \mid \text{blerp}$
Terms	$e ::= v \mid e_1 + e_2 \mid e_1 \cdot e_2$

¹Don't be surprised—that's how most assignments work.

²Seriously, use singular they. It's got a literary pedigree—Billy Shakes himself used it!—and it is gender neutral.

$$\frac{}{\text{blerp} + v \longrightarrow \text{derp}} \text{ (PLUSBLERPL)} \qquad \frac{}{v + \text{blerp} \longrightarrow \text{blerp}} \text{ (PLUSBLERPR)}$$

$$\frac{v_1 \neq \text{blerp} \quad v_2 \neq \text{blerp}}{v_1 + v_2 \longrightarrow \text{herp}} \text{ (PLUSREST)} \qquad \frac{}{e_1 \cdot e_2 \longrightarrow \text{blerp}} \text{ (TIMES)}$$

$$\frac{e_1 \longrightarrow e'_1}{e_1 + e_2 \longrightarrow e'_1 + e_2} \text{ (PLUSL)} \qquad \frac{e_2 \longrightarrow e'_2}{v_1 + e_2 \longrightarrow v_1 + e'_2} \text{ (PLUSR)}$$

Figure 1: Semantics of DUMBLANG

Variable	Description	Routing Constraints	State Constraints
u, v	edge nodes (ports in OBS)	$\sum_j R_{uvuj} = 1$ $\sum_i R_{uviv} = 1$ $\sum_{u,v} R_{uvij} d_{uv} \leq c_{ij}$ $\sum_i R_{uvin} = \sum_j R_{uvnj}$ $\sum_i R_{uvin} \leq 1$	$\sum_n P_{sn} = 1$ $\forall u, v. \forall s \in S_{uv}. \sum_i R_{uvin} \geq P_{sn}$ $\forall (s, t) \in \text{tied}. P_{sn} = P_{tn}$ $P_{suvij} \leq R_{uvij}$ $P_{sn} + \sum_i P_{suvin} = \sum_j P_{suvnj}$ $\forall s \in S_{uv}. P_{sv} + \sum_i P_{suviv} = 1$ $P_{sn} + \sum_i P_{suvin} \geq P_{tn}$
n	physical switches in the network		
i, j	all nodes in the network		
d_{uv}	traffic demand between u and v		
c_{ij}	link capacity between i and j		
dep	state dependencies		
$tied$	co-location dependencies		
S_{uv}	state variables needed for flow uv		
R_{uvij}	fraction of d_{uv} on link (i, j)		
P_{sn}	1 if state s is placed on n , 0 otherwise		
P_{suvij}	d_{uv} fraction on link (i, j) that has passed s		

Table 1: Some optimization problem.

Other papers might define an optimization problem (Table 1). Again, please note that these Figure and Table numbers are automatically made by L^AT_EX using `\label` and `ref`.

3.1 Discrete math

We can write formulas, it's awesome:

$$\sum_{i=0}^n i = \frac{n \cdot (n + 1)}{2}$$

You should be able to write **bold**, underline, *italic*, and colored text.

Headings for paragraphs There are lots of ways to break up your text. Sometimes you want to number things, sometimes not. Consistency is nice, but keep your eyes on the prize: clarity. Do whatever it takes to communicate your ideas as briefly and clearly as possible.

I particularly like to use space to denote breaks or pauses: it's good to take a breath before summarizing a section, and headings like "Summary" are often unnecessary.

But horizontal rules feel heavy.

4 Related work

No article is an island: every paper has a context in the literature. It's important that you be able to situate your work in its context. If you're doing a survey paper, then you're *studying* the context, so your entire paper is effectively "related work".



Figure 2: CS190 Professors

If you're doing original research as part of a senior project, you'll need to relate what you've done to what other people have done. It's very tempting to view what others have done as bad—that's why you came along and did all of your awesome work, right? Even if you're right, it's not nice. Don't say "them bad, us good"; say:

Them good, us better.

Acknowledgments

If someone helped you prepare a document, it's nice to acknowledge their contributions even if they're not an author. For example, you could acknowledge your CS190 professors (Figure 2). More seriously, I'd like to acknowledge the authors of the `latexmk` package, which is a very useful tool for automatically building documents using \LaTeX .

References

- S. Pinker. *The Sense of Style: The Thinking Person's Guide to Writing in the 21st Century*. Viking, 2014. ISBN 0670025852.
- J. M. Williams and J. Bizup. *Style: Lessons in Clarity and Grace*. Pearson, 2013. ISBN 0321898680.