

Writing a Research Paper

How to Write a Great Technical Paper

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Abstract

The abstract is always a single paragraph. The abstract is the first thing people read when they encounter your paper; hence, it is crucial that it outlines all the important aspects of your paper. Make your abstract incredibly concise and clear. You start with the problem and end with why your solution is interesting. Briefly explain why your solution is valuable and how you have evaluated it. Keep your abstract small. Typically, the abstract should be approximately 100 words.

Keywords: Research Paper; Template; Technical; Writing; Developing; Outlining

Introduction

The introduction sells your research. It tells the reader about the problem. It tells the reader about why it is important. Your introduction should be five clear well defined paragraphs.

- What problem are you solving?
- What is the motivation? (What's so interesting and important?)
- Why is it hard? (e.g., why do naive approaches fail?)
- Why hasn't it been solved before? (Or, what's wrong with previous proposed solutions? How does yours differ?)
- What's your approach? How did you solve the problem? Are there any specific limitations.
- [Optional] How the rest of the paper is structured.
e.g., The rest of this paper is structured as follows: first we discuss the related work in section 2, and then describes the implementation in section 3. Section 4 describes how we evaluated our system and presents our results. Section 5 gives the conclusions and future work.

Starting examples:

This paper attempts to address the problem of the applicability of in by considering It surveys a number of answers to this question. Our method offers a simplistic, robust, and reliable scheme.

This paper attempts to introduce the reader to

(Catch the reader's attention, **Anecdotes**, **Proverbs**, Facts, Real-World Examples...)

The problem this paper addresses is

[Optional] Contribution paragraph

Adding a contribution paragraph can help your reader identify in a single instance what the purpose of this paper is - it tells the reader in a single paragraph the novel contribution you are presenting. This paragraph should tell the reader what is the reason for the paper, what YOUR contribution is.

Related Work

How others have solved this problem before and why are they less effective than your method.

- Don't only point out flaws in other work. Try and focus on the differences between your work and theirs. Point out both strengths and weaknesses.
- Political point of view – your paper has to be reviewed and the reviewers need to be experts in the field. Hence, it is not uncommon for journals and conferences to choose reviewers based upon your references. Be aware that your reviewers will be reading what you say about their work.

[Optional] Comparison Grid

To help make your papers contributions stand out. To make a clear comparison between related work and your own, it might be worth using a comparison grid. A comparison grid helps the reader clearly identify features differences between yours and similar works.

Implementation

The Implementation section can vary greatly in length depending on if it's for a journal, a technical report or conference paper. Sometimes the implementation part of the paper can feel like a paper within a paper. Starting, with an introduction and an outline, then following on with various sub-sections.

- Introduction to the overall structure of your implementation
- How it was designed to address the problem effectively
- Subsections
 - How the solution will work
 - Level of detail
 - Proposals (convince the reader)

Evaluation

- How the solution was tested
 - Performance compared to other solution
 - Design compared to other methods in related work
 - How our solution
- Why, how and to what degree is our solution better?
- Why is our solution impressive?
- Comments
- Context and limitations of our solution
 - What is missing, what do and don't the results give us

Conclusion and Future Work

- The problem we have solved
- Our solution to the problem
 - If you have written a good paper, then at this point the reader should already be convinced and agrees with you.

- Why our solution is worthwhile and of significance
- Why the reader should be impressed, why our solution is valuable
- What we will (or could) do next

References

Douglas Niehaus, S. G. (n.d.). *Generic Technical Paper Skeleton*. Retrieved from <http://www.cse.unl.edu/~goddard/Courses/CSCE855/Generic-Technical-Paper-Skeleton.pdf>

Kenwright, B. (January, 2011). *Mendeley Comparison Grid*. Retrieved from <http://www.xbdev.net/mendeley/comparisongrid/index.htm>

Widom, J. (2006, January). *Tips for Writing Technical Papers*. Retrieved from <http://infolab.stanford.edu/~widom/paper-writing.html>

Additional Template Notes

Grammar and Style

You cannot use *concatenation* (e.g., *it's*, *can't*, *won't*, *you're* ...)

Mind Map

A mind map can help with brainstorm, giving you ideas you never thought of. It can also help lay a map for the flow of your paper.

Images and Diagrams

An image is worth a thousand words. While it is important that you describe concisely and in detail your research, if a diagram helps clarify understanding, add it.

You can't just plonk down an image and caption in your paper. All images and diagrams must be referenced in the body of your text.

Grammar/Writing Tools

Edit-Minion - Free Copy Web-based Copy-Editor

<http://editminion.com/>

Concordance - word and phrase example search

<http://conc.lex tutor.ca/concordancers/>

PaperRater – Grammar, spelling and free online proof-reader

<http://www.paperrater.com/>

Online-Utility – sentence analyzing tools (readability tests)

<http://www.online-utility.org>

Academic Phrasebank

<http://www.phrasebank.manchester.ac.uk/introductions.htm>

Sentence Rephraser

<http://www.gingersoftware.com/products/sentence-rephraser>

Manage Conference Deadlines

WikiCFP – Conference TimeLine and Event WebSite

<http://www.wikicfp.com>

http://www.lex Tutor.ca/concordancers/concord_e.html

Phraseup* assists you with writing by finding and filling-in the words you can't remember

<http://www.phraseup.com/>