

How to Write an
Independent Work Paper
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Outline from Web Site

- Motivation and Goal = Introduction
- Problem Background and Related Work
- Approach
- Implementation
- Results
- Conclusion

Enhanced Outline

- Abstract
- Introduction
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- Evaluation
- Conclusions and Future Work
- Bibliography
- Appendices

Abstract

- Optional
- Good idea
- Succinct!
 - Problem
 - Results
- Not
 - Notation
 - Background

Abstract Example

“This paper details the design, development, and evaluation of a Kinect-powered application to facilitate the instruction of ballroom dance. The application uses the Kinect camera’s skeletal tracking capabilities to teach and evaluate users through various ballroom dance positions and concepts, taking the form of a number of training modules that end with a game-like assessment portion. This application aims to fill a hole in ballroom dance instruction, providing the ease of access of self-study materials alongside the quality of instruction of live coaching.”

“Using Kinect To Learn How To Ballroom Dance”
Michael Li, Fall 2015

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Introduction

- State your goals in 1st paragraph!
- Be explicit about your contribution!
- Motivate the work
 - Why do we care?
 - Give examples of problem
- Brief

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Background and Related Work

- Context of your work
- What is known?
- What is similar?
- May list several works
 - “Several others have proposed approximations [a,b,c].”
- Briefly summarize closest, most important to your work
- You have the time (pages)!
 - Compare Simon Peyton Jones’ advice

Simon Peyton Jones Microsoft Research Cambridge “How to write a great research paper”

- Written for [conference papers](#)
 - Limited pages!
- Good advice:
 - “Be generous to the competition.”
- Advice not applicable
 - Related work at end
 - “highly compressed description”

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Approach

- **Big picture** driving details to follow
- What is big idea of your solution?
 - Design?
 - Experimental approach?
 - Theoretical approach?
 - New domain?
- What makes it different from previous?

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Implementation

- Give details important to
 - achieving your goals
 - proving your claims
- Can someone reproduce your success from the details?
- Why as well as how

Advice

- Often one section not best organization
- Varies by project
- Discuss with your adviser
- **This is not a diary!**
- Sometimes failed attempts worth mentioning
 - Example: Mention chose certain clustering algorithm among several tested

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Evaluation

- How successful is your project?
- What are the criteria for success?
 - Actually should state these earlier
- Experiments to show success?
 - Performance evaluation
 - Quantified user studies
 - Comparison to other methods or products
- Quantitative measures of success
 - Statistical significance of results
 - Comparison to “gold standards”

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Conclusions and Future Work

- Can be one or two sections
- Summary of important contributions
- Discuss how you would go forward
- Discuss how others can go forward

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Bibliography

- All papers, videos, ... you mention in the text
- All tools you use (and so mention in the text)
- Other references you may have used but not cited in the text
 - e.g. background reading
- Relevant private communications
 - e.g. researcher sends you unpublished performance numbers that you use in text
“Joe Smith, private communication, 2016”
- What did I forget?

Bibliographic Form

- Many acceptable forms
 - Different publishers, different forms
- Authors, paper title, publication title, publisher, date, pages. (online pointer)

[8] Jon Kleinberg. “Authoritative Sources in a Hyperlinked Environment.” In Proc. 9th ACM-SIAM Symposium on Discrete Algorithms, pp. 668—677. New York: ACM Press, 1998.

Citations in text

- Use number in brackets to refer to biblio. entry:
“The HITS algorithm[8] also computes a link-based ...”
- Using a bibliographic tool makes things easier
– e.g. bibtex for latex
- Footnotes for asides - sparingly
“... traverse index in reverse chronological order²...”

²Although this is not an absolute requirement ...”

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Appendices

- Optional
- **Never ever** expect reader to look at
- Uses
 - Data tables summarized in paper
 - Details of long proof
 - Other details interesting to only those very involved
- A luxury of a thesis or “mini thesis”

What everyone wants to know: How many pages?

Averages for a small sample of A-level papers

Section	1 sem. proj.	thesis
Introduction	avg. 1.5	2-8, avg. 3.5
Related Work	avg. 4.5	avg. 7.5
Approach	1 – 8, avg. 3	1-8, avg. 3.5
Implementation	avg. 10	avg. 13.5
Evaluation	avg. 5.5	avg. 11.5
Conclusions	avg. 1.25	1-7, avg. 3.5

Look at some examples

Writing advice- high level

- Write for a **general technical audience**
 - e.g. all your COS classmates
 - not for your adviser!
- **Don't blur your contributions** with those of others.
 - “We know that ...” Your result? Someone else's?
- **Get feedback** on drafts
 - classmates, parents, ...

Writing advice - details

- Don't use abbreviations, acronyms without defining them
 - “The Domain Name System (DNS) becomes a bottleneck.”
- Only use notation when necessary
- Define terms and notation clearly
- Proofread!
- Spell-check!

Writing advice – graphics

- Use figures to help clarity
 - data interpretation
 - architectures
 - interfaces
 - ...
- Do not overuse figures
- Figure sizes
 - large enough to easily read
 - don't pad paper with unnecessarily large figures

More writing advice additions from Simon Peyton Jones

- Don't end "Introduction" with enumeration of sections to follow
- Use examples when describing your problem (but don't substitute for a clear specification)
- Use active voice; passive voice "deadens the paper"
- "Use simple direct language"

Writing advice - form

- 12pt Times-Roman font
- 1-inch margins
- double-spaced
- Latex template files posted
 - No latex "journal format"

Writing advice - procedure

- Start with [extended outline](#)
- Don't try to write it all at once
- [Write something](#), even a few lines, [every day](#)
- “Don't fall in love with your prose
writing and rewriting is what every author does to
create papers that are both convincing and clear”
[Dr. Rob Fish]
- Use [headers and sub-headers](#)
 - helps illuminate [logical flow](#) of paper

Summary

- Follow outline but don't be shackled by it
- Don't lose the big picture for the details
- Will this be clear to others?
- Give yourself time to develop the paper day by day
- See posted examples

Acknowledgement & Reference

- Thanks to independent work co-coordinator [Rob Fish](#) for comments and contributions

- Reference

Simon Peyton Jones of Microsoft Research
Cambridge, "How to write a great research paper"

[https://www.microsoft.com/en-us/research/
academic-program/write-great-research-paper/](https://www.microsoft.com/en-us/research/academic-program/write-great-research-paper/)