Seminar Advanced Computer Architecture

How to Write a (Seminar) Paper

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Overview

- goal of the paper
- structure
- language
- correct citations
- further information
- summary

Word-smithing is a much greater percentage of what I am supposed to be doing in life than I would ever have thought.

DONALD KNUTH

- acknowledgement
  - the contents of this lecture (very closely) builds on a presentation by Holger Karl, University of Paderborn.
Goal of a Scientific Paper

• primary goal: efficient communication and transfer of information
• presentation of technical facts
• discussion/comparison of different approaches
• assessments, recommendations
• presentation of conclusions

• goal of a seminar: training these skills by means of sufficiently complex materials
Structure

• paper is structured into distinct parts
• typical structure of a paper (technical report, Master's thesis, research paper, ...)
  – title
  – abstract
  – introduction
  – related work (variant 1)
  – body of the text
  – related work (variant 2)
  – summary, conclusions
  – outlook
  – bibliography
  – appendix
• can vary depending on situation
• find a good balance between
  – accurate specification of the topic
  – bait to attract interested readers
Abstract

• very brief but
  – should contain the essence of everything presented
  – determines whether people will read the paper
  – probably the most important section (indexed by databases)

• structure recommended by Koopman
  – motivation: why should we care about the problem and the results? scope of the work (general or specific)?
  – problem statement: what problem are you trying to solve?
  – approach: how did you go about solving the problem? what methods are used (simulation, analytic model, prototype, ...)?
  – results: what is the answer? try to be specific, i.e., instead of "significantly improve" write "accelerate by 15%", leave judgment to readers
  – conclusions: what are the implications of your work?

• title and abstract give the reader a rough idea of the topic
• introduction
  – limits the scope of the topic
  – explains the importance of the problem and its relation to other problems
  – touches all areas and background that is relevant for understanding (but no additional areas)
  – creates interest of the reader
  – explains how the topic shall be discussed
  – summarizes the contents in more detail than the abstract
  – presents an overview of the structure of the paper
    ▪ "In the following Section 2 we will introduce ... Section 3 defines our models ... Finally, we draw conclusions and outline future work in Section 9."
Related Work

- presents an overview of other work that is relevant for in-depth coverage of the topic
  - but can discuss each work only briefly
- provides a critical discussion of these works with the presented approach
  - describes the respective advantages and disadvantages, different assumptions, commonalities, possible syntheses
- sometimes presented as the last part before the summary and outlook
  - advantage: the increased background knowledge from reading the paper makes it easier for the reader to understand the connection to related work
  - disadvantage: relation of paper to other work becomes only clear very late in the paper
- special case: survey papers, consist basically only of related work
Body of the Paper

• actual core of the paper
  – precise definition of the assumptions
  – description of the chosen methods for study
    ▪ analysis, simulation, experiment, prototype
  – description of the actual study, experiment or system
    ▪ experimental setup, simulation parameters
  – if possible: presentation of results
    ▪ measurement results
    ▪ experiences with the proposed method, architecture, ...

• no common structure
  – varies strongly with topic
  – presentation usually divided into distinct sections
Summary and Conclusion

- summarizes the results
- discusses results in a wider scope or from a more general perspective
- can issue recommendations if appropriate
  - "the proposed method is promising when applied to ..."
  - "our architecture is nonsense" (probably rarely...)
- stresses what can be learnt from the work, which has not been known before
- discusses scope and limitations of the work
- apart from the abstract the most important part of the work
Language – Primary Goals

• **primary goals**
• **precision and clarity**
  – use the right word, the correct expression
  – use a dictionary, never (or rarely) a thesaurus
  – consider connotations and associations, in particular in foreign languages
  – beware of synonyms with different connotation
  – present precise details (not everything, but everything relevant)
  – avoid ambiguity (be careful with pronouns, restrictive vs. non-restrictive clauses, ...)
    ▪ that: restrictive clause, no comma
    ▪ which (who, whom): non-restrictive clause, comma
• primary goals
• guide the reader with structured explanations
  – no suspense needed
    ▪ a paper is not a thriller
    ▪ you don't have to save the best part for the end
  – start each section with a brief introduction and conclude with a brief summary
    ▪ allows the reader to put the content into context
  – explain your findings using a top-down structure
    ▪ most common problem in my experience
    ▪ example: "There is method A to do something. And there is method B. And finally, there is method C."
    better: "There are three methods A, B, and C. A and B share property Y, while C uses approach Z." Then, for example, explain each method in a subsection
  – use enumerations and lists to express structure
Language – Secondary Goals (1)

• secondary goals
• familiarity
  – the reader must know your language and terms
  – define unknown terms and abbreviations on first use
  – beware of jargon
• forthrightness
  – direct language
  – don't use passive just to avoid the first person
    ▪ "I, the author" or "we = we, the authors" is always acceptable
    ▪ "we = you, the reader and I, the author" is acceptable most of the time
    ▪ "we = we, the humanity" (or similar) is in general not acceptable
  – English allow to "activate" almost everything, e.g.,
    ▪ "the algorithm computes .... " instead of " ... is computed by the algorithm"
Language – Secondary Goals (2)

• secondary goals

• conciseness
  – no embellishments – write sentences in their simplest form
  – eliminate unnecessary, empty, bloated phrases and repetitions, e.g.

    instead of „In order to find the solution of the equation, we can use one of two alternative methods“ write
    "To solve the equation, we can use one of two methods"

• fluency
  – sentences and paragraphs connect logically to each other
  – take up and continue the flow of thought
  – use bridging words and phrases
  – use similar expressions for similar concepts
  – discuss one aspect or point of view in one paragraph and take up the discussion in the following paragraph from a different point of view
Language – Secondary Goals (3)

• secondary goals
• vividness
  – explain using examples or analogies
  – but stay precise!
• illustrations
  – ... are easy to remember
  – ... can explain, exemplify
  – ... need captions such as Figure 1, or Table 5 allowing to reference them in the text
  – label illustrations (axes, legends, ...)
  – try to avoid placing illustrations in the text before the first reference
Language – Secondary Goals (4)

• style
  – alternate between short and long sentences
  – use appropriate punctuation
  – avoid footnotes and endnotes

• note
  – content is more important than elegance
  – don't follow the rules blindly, but don't break the rules carelessly
Citing Correctly

• always cite with reference to original source – intellectual honesty
• bibliographic entries should make finding the sources as easy as possible
• different cases
  – bibliography contains all bibliographic information
  – reference in the text → index in the bibliography
    ▪ in most cases, numerical reference: [17]
    ▪ rarely abbreviations for author and year of publication: [MS97]
    ▪ almost never: author, year (Müller und Schmidt, 1997)
  – wording
    ▪ ... these results could be validated [17].
    ▪ As discussed in [18], ...
    ▪ As Müller und Schmidt [17] have shown, ...
    ▪ Never: [18] discusses ... (an article doesn't discuss anything)
Citing Correctly (2)

• complete source
  – author(s)
  – title
  – kind of publication? (book, journal article, part of conference proceedings, part of a book, technical report)
    ▪ title of the journal, book, etc.
    ▪ editor (if appropriate)
    ▪ page numbers
  – year, month and place of publication (location of the publisher)
  – publisher
  – URLs can be helpful, but should be persistent, if possible use doi (document object identifier)
  – additional information on demand
• use tools for collecting bibliographic information
  – recommendation: BibTeX
Summary

bullet the goal of a paper is efficient communication of information
  – everything else is just a means to an end
bullet structure of a paper
  – abstract, introduction, body of text, summary
bullet language
  – primarily: precision, clarity and structure
  – primacy of the content
  – take care of good style
  – write English
bullet cite correctly and completely