Write like a Computer Scientist

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Flow of a Typical Science Project

- Problem
- Evaluation
- Current efforts to solve the problem
- Our solution to the problem
- Evaluation of a specific instance of the problem
- Analysis
- Results
- Conclusions
- Your Contribution

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Your Contribution to Science

Tell the world of science about your contribution.

A drop in the ocean, but it keeps science going!
What do you get from writing a research paper?

Convey an Idea

Inform the scientific community about your work.

Invite critique and engage people in the same domain.
How to Write a Research Paper?

+ Great Care to be taken while writing a paper
  + Critical to have a paper that is well written, clear and concise in order for it to be appreciated and have an impact

+ General Considerations
  + Story
  + Clarity
  + Conciseness
  + Grammar and Language
Sections of a Typical Research Paper

- Title
- Abstract
- Introduction
- Related Work
- Your Solution
- Evaluation Methodology
- Results
- Discussion
- Conclusions and Future Work
- Acknowledgements
- References
Choosing a Paper Title

+ A paper’s title is very important

+ Choose a title wisely.

+ Thousands will read the title of a published paper
  + Only hundreds might actually read your paper in full.

+ Title should capture the essence of the paper in the fewest possible number of words.
Examples of Titles

+ **Go To Statement Considered Harmful**
  + E. W. Dijkstra, 1968

+ **The Case for the Reduced Instruction Set Computer**
  + D.A. Patterson et. al. 1980

+ **A Case for Redundant Arrays of Inexpensive Disks (RAID)**
  + D.A Patterson, Garth Gibson, Randy H. Katz, 1988

+ **The Anatomy of a Large-Scale Hypertextual Web Search Engine**
  + S. Brin and L. Page, 1996

+ **Xen and the Art of Virtualization**
  + P. Barham et. al., 2003
Abstract

+ Critical portion of the paper
  + Summarize the paper for the reader
  + A clear and concise abstract is best

+ Abstract and Introduction usually influence the decision of the reader to proceed with your paper or not

+ Best written after the rest of the paper is complete
Style: Move Structures

+ A move is a step taken by writers to achieve part of the overall purpose

+ A move structure is a flowchart-like representation of the moves within a genre

+ Structural features of text can be described formally using move structures:
  + Patterns
  + Transitions
  + Repeated Moves
  + Sequencing of Moves
Abstract Move Structure

1. State What Was Done
   - 1.1 Identify the research area and its importance
   - 1.2 Mention a gap addressed by the work (optional)
   - 1.3 State the purpose and accomplishment(s) of work

2. Identify Methods Used
   - 2.1 Technique and Approach to solve the problem

3. Report Principle Findings
   - 3.1 Highlight Major Results
   - 3.2 Offer a concluding remark (optional)
Abstract Example

Identify the Research Area

Mention a Gap

Introduce your Work

Describe your work and mention some key findings if required.

Abstract From: A Case for Redundant Arrays of Inexpensive Disks (RAID)
D.A Patterson, Garth Gibson, Randy H. Katz, 1988

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Introduction Section

- Answer the following questions
  - What was the problem?
  - Why is it important?

- Not all readers maybe familiar with the problem
  - Describe the general domain before heading into specifics.
  - Cite important papers and refer to the work as required.

- Gradually introduce a gap and motivate the problem.

- Fill the gap by introducing your work

- Roadmap for the rest of the paper.
Introduction Move Structure

1. Introduce the Research Area
   • 1.1 Identify the research area
   • 1.2 Establish the importance of the research area
   • 1.3 Provide essential background information about the research area

2. Identify a Gap or Gaps

3. Fill the Gap
   • 3.1 Introduce the current work
   • 3.2 Preview key findings of the current work

Cite Relevant Literature

General

Specific
Related Work Section

+ Answer the question:
  + What have others done on this or related problems?

+ Can be placed after the Introduction or before the Conclusion sections.

+ Must be thorough and should encapsulate as much of the related work as possible.
  + Describe other work in a few sentences and compare your work to theirs (optionally).
  + Reviewers will want to compare and contrast your research with others in the domain.
Solution Overview Section

• Answer the questions:
  – How did you study the problem?
  – What is your proposed solution?
• Present your solution for a specific instance of the problem.

1. Solution Description

  • 1.1 Describe the proposed solution in Detail
  • 1.2 Effective use of Diagrams can work well in visually describing your solution
  • 1.3 Provide formal descriptions of Algorithms and Proofs if they are novel.
Evaluation Methodology Section

+ Answer the question:
  + How can you prove your Solution is effective?

+ In order to prove that you have an effective solution to the research problem, you will need to evaluate it and present the results
+ Your evaluation can be experimental or theoretical
+ Present your evaluation parameters in detail
+ State any assumptions made
+ Give enough information for reproducibility
Results Section

+ Answer the Question:
  + What did you observe?

+ Presenting the results in a neat and logical manner is crucial to convincing the reader about the efficacy of your solution

+ Each result set should be displayed in a graphical or tabular forms
Results Set Move Structure

1. Set the Stage

• 1.1 Remind readers briefly how you obtained the results
• 1.2 Refer readers to a graphic that displays that set of results

2. Tell the Story of Scientific Discovery

• 1.1 Guide readers through the results as you do one or more of the following:
  - Identify key findings and discoveries
  - Describe Important Events
  - Highlight Unexpected Results

Repeat (as needed) for each set of results
Analysis and Discussion Section

+ Answer the question
  + What do the findings mean?

+ Discussion can be a separate section or integrated with Results as follows:

Option 1
Single Result to Present

Option 2
Multiple Results to Present
Final Sections

+ Conclusion Section
  + Very brief summary of the work to remind the reader (optional)
  + Indicate overall implications of your findings
  + What does one learn from your findings

+ Future Work Section
  + Describe future studies based on your conclusions and findings
  + Do not hesitate to mention shortcomings of your work that you intend to cover in the future.

+ Acknowledgements
  + Funding agencies and sponsors (if any)
  + Other people (non-authors) who helped with the work.
Discussion and Conclusion Move Structure

1. Discuss Specific Results
   - 1.1 Remind reader of results
   - 1.2 Interpret results

2. Conclude the Paper
   - 2.1 Summarize the work
   - 2.2 Suggest overall implications of the work

Repeat (as needed) for each set of results

Cite Relevant Literature

General

Specific
A Note on References


ACM-style references

+ Follow the reference style as indicated by the conference template strictly.

+ You can use Reference managers such as EndNote or Bibtex to simplify reference management while writing the paper.