

Technical Report Writing & Research Methodology

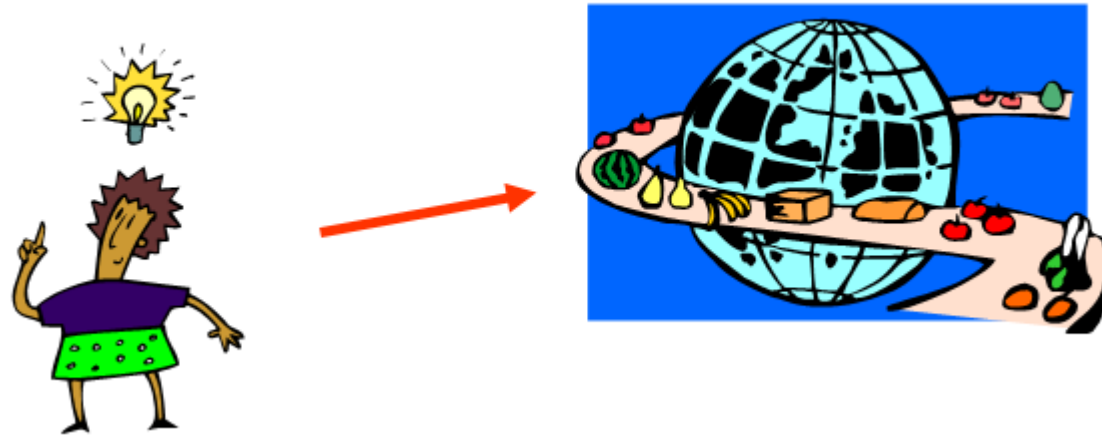
Reading Research Articles

Course Instructor

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What is Research?

- Discovery of new things that have been independently verified by other professionals.
- Contribution to the existing knowledge in some way.
- Something new to humanity (not just new to you or your group).



The Research Community

- All use the same scientific method.
- All follow the same ethical principles.
- All use the same language and terms.
- All provide information to the world-wide community reported in a complete and open manner.
- All acknowledge the previous work of others.

Why read Research Papers?

- The more you read, the better you will be able to write your own.
- Researchers read research papers to
 - Review them for a conference or a journal.
 - keep up-to-date in their field.
 - Conduct a literature survey of a new field.
- Researchers read relevant papers on regular basis.
- Learning to efficiently read a paper is a critical but rarely taught skill.

Structure of Research Papers

Section	Purpose of the Section
Abstract	To briefly introduce the reader to the aims of the study, the methodology, results and findings.
Introduction	To state a clear overall purpose for the study. To define the research question(s) of the study. To give a very brief background of relevant theory and practice for your topic.
Literature Review	Review of the current literature on the research topic. To summarize what conclusions have been reached in the literature so far for this problem. To highlight main issue and controversies around the problem.
Methodology	Presents the techniques and methods used to address the problem in hand. To demonstrate that you are aware of the research methods used to study this topic. To explain and justify the method of data collection and analysis.

Continued

Section	Purpose of the Section
Results	To present the findings of your research in an orderly manner, using heading planned in your methodology or headings arising from patterns found in the research. Results are in the forms or figures/tables/graphs.
Discussion	To comment on the trends/findings and show your understanding of what your data suggests. To highlight anything unexpected that came up.
Conclusion	To sum up your findings and highlight the significance of the outcomes of your study. To discuss the limitations of your study and indicate where further research is needed.
References	To list all the reference materials that have been cited in the text of the report

Three Pass Method for Reading

Pass 1: 5-10 Minutes

- Read title, abstract, introduction.
- Read section and sub section headings.
- Read the conclusions.
- Take a glance at the references.

Three Pass Method for Reading

Pass 1: Output

- Type of paper ? (analysis of an existing system? Description of a research prototype? A survey paper?)
- Theoretical bases used to analyze the problem ?
- Assumptions valid?
- Paper's main contribution?

Three Pass Method for Reading

Pass 2: 1 Hour

- Read the paper with greater care, but ignore details such as proofs or experimental techniques.
- Look at figures, diagrams, graphs and other illustrations.
- Mark relevant unread references for further reading.
- Identify the limitations of the research work.

Three Pass Method for Reading

Pass 2: Output

- Grasp the content of the paper.
- After second pass, you should be able to
 - Summarize the main thrust of the paper, with supporting evidence, to someone else.
 - This level of detail is appropriate for a paper in which you are interested, but does not lie in your research specialty.

Three Pass Method for Reading

Pass 3: 1 Hour (reviewer) / 4-5 Hours (beginner)

- Virtually re-implement the paper.
- Compare the actual results with virtual results.
- Jot down ideas for future work.

Three Pass Method for Reading

Pass 3: Output

- Reconstruction of the entire structure of the paper.
- Identification of strong and weak points.
- Pinpoint implicit assumptions, missing citations to relevant work.
- Pinpoint potential issues with analytical or experimental techniques.

Where to find Research Papers?

- Search relevant papers using keywords on IEEE Explore, ACM, HEC Digital Library.
- Identify research groups/authors working actively in your area of interest.
 - Go to their website.
 - Find where they published recently.
- Look at websites of top conferences and look their recent proceedings.

Assignment

- Read two research papers of your choice relevant to your interest area.
- Write down one paragraph for each paper outlining the **main contribution** and **limitation of the research work**.
- Submit your assignment within two weeks time starting from today.

Acknowledgment

The three phase approach for reading a research paper presented in this lecture is inspired by S keshav's [How to Read a Paper](#).