

Writing a Technical Research Paper CSC 300 Advanced Computer Architecture and Embedded Systems

Purpose

This assignment is designed to expose students to technical research and engage them in the process of how research is conducted. Exposing students to the process fulfills several objectives.

- Students have in-depth exposure to a topic of their choosing.
- Students find and read at least four technical papers on their topic.
- Students identify, critically analyze and summarize at least four technical papers.
- Students identify a significant problem from their “literature search.”
- Students propose a research strategy to gather data and generate results toward answering their research question.
- Students write and present a technical paper that presents their problem, background, their strategy for getting results toward answering their research question, speculation on the results that they might get using the proposed strategy, and they must format their paper using a standard format including references.

Methodology

The schedule below details the steps for the assignment. For each step, students submit a written document. For example, the proposal for a technical paper requires the student to propose a research topic based on four or more technical papers they had read on the topic. Similarly, students peer-review papers using the technical paper grading rubric below. The peer-review is done on a draft of the paper, and is returned to the student for revision. The peer-reviews are also discussed in class. The final paper is presented to the class and invited guests.

Results

This is an upper-level, special topics course, so students are either junior or seniors. They have reached a level of intellectual maturity where they are able to handle an assignment like this. As expected, better students became very engaged in the assignment, finding topics that they found inherently interesting. Even students who were not as engaged, did respectable work and completed the project with a better understanding of a particular research topic, but also a better understanding of how research is done.

CSC 300 Advanced Computer Architecture and Embedded Systems

Technical Paper Assignment

Objectives*

Application:

- Read and analyze technical Computer Science literature.
- Develop new insights from your literature analysis.
- Write a technical paper presenting your new insight.

Human Dimension

- Appreciate how computer scientists create and share knowledge.
- Be a contributing member of a learning community.

Caring

- Develop a perspective on computing system performance and its social impact.
- Become interested in learning more about topics of interest in computer architecture and embedded systems.
- Enjoy being a member of a learning community.

Learning How to Learn

- Know how to search the Computer Science literature for information of interest.
- Know how to read and understand Computer Science literature.
- Know how to synthesize knowledge from several sources to create new insights.

Overview

You will read and analyze at least four technical papers on a topic of your choosing related to the course material. From your literature review, you will develop insights that you will report in a technical paper. You will also write a personal reflection on what you learned by writing a technical paper, and how you learned. This reflection will be submitted separately from the technical paper.

Schedule

Select topic	Thu, Feb 24, 2005 (Week 5)
Summaries of four technical papers	Thu, Mar 31, 2005 (Week 9)
Proposal for technical paper	Thu, Apr 7, 2005 (Week 10)
Draft technical paper and peer review	Thu, Apr 21, 2005 (Week 12)
Final technical paper	Thu, Apr 28, 2005 (Week 13)
Personal reflection on technical paper	Final Exam Period (Week 15)

* Based on the *Taxonomy of Significant Learning* in L. Dee Fink *Creating Significant Learning Experiences*, Jossey-Bass, 1998.

Structure of a Technical Paper

Title and Author

- Title – 10 words or less tells what paper is about. The title should convey something about the topic. The title should engage the reader.
- Author(s) – who wrote the paper.
- Author(s)'s affiliation – for what institution did the author write the paper.

Abstract

- Explains the purpose of the paper.
- Summarizes the main results.
- It gives the reader a sense of where the paper is going.
- It is usually 200 words or less.

Introduction

- Introduces the context and significance of the topic.
- States the problem or thesis of the paper.
- Provides background information, such as similar work done by other researchers.
- Defines relevant terms and introduces necessary concepts.

Body

- Details the author's approach to the problem or argues for the author's thesis.
- The presentation follows a clear, logical development of ideas.
- Tables and illustrations support and clarify the author's presentation.
- If original research is presented, the author discusses the results of the research, and its novelty and significance.

Conclusion

- Summarizes the significance of the topic.
- Summarizes research results or thesis.
- Summarizes information supporting the results or thesis.
- No new information is introduced.
- Short and to the point
- Provides further reflection on the topic and considers future work.

References

- Citations for all background information.
- Citations match references in the text.
- Citations follow a recognized, standard format.

General Considerations

- The topic is current and of interest to the reader.
- The style is consistent. Typically scientific papers use the passive voice and do not use personal pronouns such as "I".
- The audience is scientifically literate and is usually somewhat familiar with the topic.
- There are no spelling or grammar errors.
- The sentence structure is varied to maintain the reader's interest.
- There is no gender-bias.
- Formatted according to CCSCNE formatting instructions:
<http://www.cscne.org/for/authors/format.html>

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Technical Paper Assignment

Paper Summary Guidelines

Summarize each individual paper. Do not attempt to make comparisons between papers unless one paper references another as background.

The summary should be about one, single-spaced page.

Each item should be supported by a quote from the paper. I suggest that you find sentences in the paper that answer the questions below.

Introduction

- What is the purpose of the paper? What is the problem that the paper is attempting to solve? Why did the author write the paper?
- Why is the problem important? What are the benefits of solving this problem? What is the context in which the paper is written?
- What previous work has been done on the problem? What papers does the author use to show that the problem is important? What work does the author use to show that there is a problem to be solved? Give a brief description of at least two of the other approaches, if there are two or more. If there are not two other approaches, how does the author explain why there is no work on this problem?
- What is the author's approach? Why is this a new and novel approach to solving the problem? Papers are not published if the problem is not important, or the approach is not novel.

Body

- Give details of the author's approach in no more than one paragraph. The explanation must be clear to demonstrate that you understand the basic idea. You should not give too much detail which might be interpreted as just copying what the author wrote without your understanding.
- Give evidence that the author's approach works. How does the author show that the proposed solution to the problem works, and that it improves on previous methods? What experiments were performed? What were the results? Results without a description of how they were found are meaningless. Again, do not give too much detail; give the basic idea.

Proposal Guidelines

Your technical paper proposal makes the case to pursuing work on the full technical paper. Your proposal should be no more than one, single-spaced page. Your proposal must include a brief review of the technical papers you read, and, in particular, how they relate to each other and provide an overview of previous research in the field. You must state your problem and how it relates to the previous work, and why it is important. Write the proposal to your advisor (the course instructor) for this project. It is the basis for further discussion and revision of your research problem.

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Technical Paper Grading Rubric

Author:	Score:
Use this to evaluate the technical paper based on the Structure of a Technical Paper detailed with the Technical Research Assignment. Record evidence from the technical paper under review to support your evaluation.	

Category and Comments	Points	Reviewer's Evaluation
Title and Author	5	
Abstract	5	
Introduction	10	
Body	10	
Conclusion	5	
References	5	
General Considerations	10	