Min 10 references
Read 10 papers by 4th start
early.

Writing Research Papers
IA 643

"A research paper is the culmination and final product of an involved process of research, critical thinking, source evaluation, organization, and composition. A research paper is not simply an informed summary of a topic by means of primary and secondary sources. It is neither a book report nor an opinion piece nor an expository essay consisting solely of one's interpretation of a text nor an overview of a particular topic." OWL, Purdue University

Types of Research Papers

1. Experimental/empirical paper
   To validate or test hypotheses /a new system design/method/algorithm

2. Theoretical/conceptual paper
   To offer new theory/framework/model/guidelines/critical insights

Structure of Research Papers

Title

- Reflects the research work
- Summarizes the hypothesis of the paper

Abstract

- States the hypothesis or research questions or purpose of your study
- Justifies your research study
- Summarizes your research findings (add this when you are done with your research)
- Mentions the key contributions of the paper

Introduction

- Provide context
- Motivation of your research
- Questions addressed
  - What is the problem?
  - Why is the problem important?
  - What has so far been done on the problem?
  - What is the contribution of the paper on the problem?
  - Is the contribution original? Explain why
  - Is the contribution non-trivial? Explain why
- Ends with a short summary of the paper's organization. For example,
  "The rest of the paper is structured as follows: In Section 2 we ... "

The following sections are referred to as the main body of your paper. Based on the type of research and authors' personal preference, different section headings may be used. For example, If a paper is fairly large and has an extensive amount of background material, you may add a section titled Literature Review.

Literature Review (optional)

(a) Provide a broad and general account of the field, which helps to create a context for your research contribution. For example,
What are the rival approaches?
What are the drawbacks of each?
How has the battle between different approaches progressed?
What are the major outstanding problems? (This is where you come in)

(b) Background
describes previous work in more technical detail, as far as needed for a proper understanding of the contribution of the paper

(c) Theory
describes the underlying theory of techniques or system where appropriate, uses a mathematical style of definitions, lemmas, propositions, theorems, etc. illustrates the main definitions and theorems with simple but meaningful examples.

Methodology (optional if your paper is just a critical literature review)

States research method used. Survey study is mostly used in social science disciplines. Experimental study is often used in computer science and engineering fields.

Specification (optional)

Describe survey instrument and its development
Describe survey subjects, procedure of data collection and analyses
or
Formally specifies techniques that underlie the implementation
States the requirements of the implementation

Implementation (optional)

Describe how the survey was administered; response rate
Or
Describes only the final state of the implementation
Identifies the major design decisions and gives their reasons
Describes the overall structure of the system and key algorithms in abstract form
Illustrates the main algorithms with simple but meaningful examples

Results

Statistical analyses of data collected from the survey or computational data from the experiment are presented
Results are often best presented graphically.

Discussions (sometimes combined with Results section)

Use the results to support or refute the hypothesis. The following is a case of a computational study,

Technique/system X automates task Y for the first time

Technique/system X automates task Y better, along some dimension, than each of its rivals, where the dimensions are typically:

(a) Behavior: X has a higher success rate or produces better quality outputs
(b) Coverage: X is applicable to a wider range of examples
(c) Efficiency: X is faster or uses less space
(d) Dependability: X is more reliable, safe or secure than its rivals
(e) Maintainability: X is easier to adapt and extend than its rivals
(f) Usability: Users find X easier to use than its rivals

Conclusions

Summarizes the research and discusses its significance

(a) The hypothesis and the evidence for and against it are briefly restated
(b) The original motivation is recapitulated
(c) The state of the field in the light of this new contribution is reassessed

References

ICCL Team (2012). How to Write a Research Paper in Computer Science, Technische Universitat Dresden, Germany

Shoop, Libby (2016). A Guide for Writing a Technical Research Paper, Macalester College http://www.macalester.edu/~bressoud/capstone/TechPaperHowTo.pdf (November 15, 2016).

Turner, Jon (2016). How to Write a Great Research Paper, Washington University in St. Louis. http://www.arl.wustl.edu/~pcrowley/cse/591/writingResearchPapers.pdf (November 15, 2016).