How to Write
Research Papers in Computer Science

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Abstract

This report tells all the process for writing a nice and worthy thesis paper,research paper or report.For publishing research papers in a well-known scientifiq magazines,that research papers must be well written.And this report says exactly that by using latex environment.

Contents

Chapter 1

Research in Computer Science and Engineering

Steps to follow:

- Study and explore your area of interest. computer science and engineering;
- Choose a research problem.
- Find one or two co-researchers and form a research group.
- Read related research papers published in good journals and conferences and present those papers in the group, by rotation.
- Sit frequently for brainstorming on the problem and try to find non-trivial results.
- Find good results around the problem and write papers.

Chapter 2

Issues of Technical Writing

2.1 Why do we need writing?

1. To express our ideas.
2. Writing good mathematical explanations will improve your knowledge and understanding of the mathematical ideas you encounter.
3. Putting an idea on paper requires careful thought and attention. Hence, mathematics which is written clearly and carefully is more likely to be correct.
4. Specifically ....
    - For publishing your research results as research papers.
    - For publishing your study and research findings as theses or dissertation to fulfil your degree requirements.
    - Writing a technical text books for students.
    - Writing review reports.
    - Technical study report.
    - Etc.

2.2 Who is Your Audience?

- Your Peers!!
- Think someone to whom you could be explaining your ideas.
- You should consider
    - What questions might be asked.
    - What confusions might arise.
    - which details you might need to trot out and explain.

2.3 Aspects of Technical Writing

2.3.1

As a valued customer of XYZ company, your call is very important to us.

What is the wrong with this sentence?

Here: "Your call" is a valued customer.

Good: You are a valued customer of XYZ company, and your call is very important to us.

Or

Good: Because you are a valued customer of XYZ company, your call is important to us.

Say What You Mean;
Mean What You Say.

2.3.2

The conjecture of Gause (1930) is false.

The lemmas of Euler (1766) and the example of Abel (1827) led Gause to conjecture that all semistable curves are modular. The conjecture was widely beleived, and more than fifty papers were written by Jacobi, Dirichlet, and Galios in support of it. To everyoness surprise and dismay, a counter example was produced by Frobenius in 1902. This counterexample opened many doors.

Must make choice to convey most effectively a given message and the sprit of the message.

2.3.3

Let X be a compact metric subspace of the space Y. If f is continuous, R-valued function on the space then it assumes both a maximum and a minimum value.

Here: X and Y are defined, but not used.

Good: Let X be a compact metric space. If f is a continuous, real-valued function on X then f assumes both a maximum and a minimum value.

Better: A continuous, real valued function on a compact metric space assumes both a maximum and a minimum value.

Minimize the number of notations.

2.3.4

$\forall x \exists y, x \geq 0 \Rightarrow y^2 = x$

difficult to read!

Better: Every nonnegative real number has a squre root.

Minimize the number of notations.

2.3.5

All continuous functions have a maximum.

All continuous functions share the same maximum!!

Better: Every continuous function has a maximum.

More preciously: Each continuous function has a maximum.

Be precise, avoid ambiguity.

Chapter 3

General Guidelines for Technical Writing

3.1 Rules and Practices of Writing

** Be careful about the language: Grammar, sentence formations, spellings, punctuation etc.

** Each paragraph should represent a specific idea.

** Smooth transition from

- One paragraph to the next
- One sentence to the next

** Write short and simple sentences.

** The opening paragraph of a section should be the best paragraph of the section.

** The opening sentence of a paragraph should be the best sentence of the paragraph.

** Every statement should be precise and correct.

Example

"The problem stated above is difficult"

- Difficult for whom?
- NP-complete?
- Believed by you?

- Believed by others?
- Proved by someone?

** Statement should be logical. Avoid sentence of the form "An x is y."

Bad: An important method for internal sorting is quicksort.

Good: Quicksort is an important method for internal sorting, because ...

** Vary the sentence structure and the choice of words to avoid monotony. But use parallelism when parallel concepts are being discussed.

Bad: Formerly, science was taught by the textbook method, while now the laboratory method is employed.

Good: Formerly, science was taught by the textbook method; now it is taught by the laboratory method.

** Do not omit "that" when it helps the reader to parse sentence

Bad: Assume G is a graph.

Good: Assume that G is a graph.

** There is a definite rhythm in sentences. Read what you have written, and change the wording if it does not flow smoothly.

Active or Passive: In computer science writing active voice is preferred.

Bad: The following result can now be proved.

Good:We can now prove the following theorem.

I or We Always use "we" even you are a single author.

3.2 Important Points for Mathematical Writing

3.2.1 Separating symbols in formulas:

Bad: Consider S_q , $q < p$.

Good: Consider S_q ,where $q < p$.

3.2.2 Not starting sentence with a symbol:

Bad: G has n vertices.

Good: The graph G has n vertices.

3.2.3 Not using symbols $\forall, \exists, \in$:

replace them by corresponding words.

3.2.4 Defining symbols before use:

Bad: Algorithm XYZ finds a drawing of G in O(n + m) time, where n and m are the numbers of vertices and edges, respectively.

Good: Let G be a graph of n vertices and m edges. Then Algorithm XYZ finds a drawing of G in O(n + m) time.

3.2.5 Not using quotations in mathematics papers frequently:

Bad: As Methuselah used to say, " When the going gets tough, the tough get going".

Good: As Methuselah used to say, " When the going gets tough, the tough get going."

3.2.6 Placing punctuation marks rightly:

Commas and periods should be placed inside quotation marks, and colons and semicolons outside quotation marks

3.2.7 Completing Sentence rightly:

Bad: We now have the following **Theorem**. *H(x)* is continuous.

Good: We can now prove the following result. **Theorem**. The function *H(x)* defined in (5) is continuous.

3.2.8 Being self-contained:

The statement of a theorem should usually be self-contained, not depending on the assumptions on the previous text.

3.2.9 Fact, Lemma, Theorem, Corollary:

Fact :

A proposition which is obviously true. Usually does not need a proof.

Lemma :

A proposition which will be used to prove other propositions. A proof is needed.

Theorem :

A proposition which gives a main result of the paper. A proof is needed.

Corollary :

Immediate from a theorem or a lemma.

3.2.10 Capitalizing names of theorems,lemmas..:

Wrong: By lemma 3, we have ...

Correct:By Lemma 3, we have ...

Wrong: We now have the following Lemma.

Correct:We now have the following lemma.

Wrong: A maximal matching is illustrated in figure 5(a).

Correct:A maximal matching is illustrated in Figure 5(a).

Wrong: In section 3 we deal with orthogonal drawings of planar graphs.

Correct:In Section 3 we deal with orthogonal drawings of planar graphs.

3.2.11 Spelling numbers or not:

Wrong: There are 5 vertices on the outer face.

Correct:There are five vertices on the outer face.

Wrong: The count was increased by two.

Correct:The count was increased by 2.

Wrong: The graph has eighty embeddings.

Correct:The graph has 80 embeddings.

3.2.12 Displaying important formulas:

Display important formulas on a line by themselves. If you need to refer to some of these formulas from remote parts of the text, give reference numbers to all of the most important ones, even if they are not referenced.

3.3 Some more points...

- Do not overuse commas.

  Bad:I went to the store, to buy some potatoes.

  Bad:In this paper, we give a linear-time algorithm.

- Do not use contraction in formal writing. **Bad:** don't, I'm ...

Chapter 4

Acknowledgement

- **Sources:**
  - D. E. Knuth, T. Larrabee and P. M. Robers, Mathematical Writing, MAA Notes, 14, The Mathematical Association of America, 1989.
  - S. G. Krantz, A primer of Mathematical Writing, American Mathematical Society, 1997.
  - R. Andonie and I. Dzitac, How to write a good paper in computer science and how will it be measured by ISI web of knowledge, Int. J. of Computers, Communications and Control, 4, pp. 432-446, 2010.
  - U. Khedker, How to Write a Good Paper? Indian Institute of Technology, Bombay (slides).
  - https://cs.uwaterloo.ca/ brecht/thesis-hints.html, accessed on August 29, 2013.