In the last lecture, we saw how we should write the title for a paper. We also critiqued some titles of published papers. In this lecture, we will continue the topic of writing in the large. We will discuss writing the date, the abstract, and the introduction. We will also critique an abstract of a paper written by Tom and his former student Geeta.

Zobel, in [1], recommends a writer to ask himself/herself a list of questions before starting to write. These are a helpful set of questions that you might ask yourself in order to set the scope of your paper. We list a summary of the questions from his list. The interested reader is referred to the actual list of questions given on page 138 in [1].

1. Which results are the most surprising?
2. Which results are worth exploring further by you or others?
3. Should the whole work be published together, or are the results independent enough to be published separately?
4. In what order should the results appear in the paper?
5. What is the key background needed in order to understand the contents of the paper?
6. Who is the intended audience/readers?

1 Writing the date

The date is an important component of the paper. It tells the reader when was the document written. Put the date manually rather than using any date functions (such as \today). Manually putting the date will tell you the date when you actually had finished writing the draft, rather than the date when the document was last processed. Different regions have different ways of writing dates. For example, in India the DD/MM/YY format is used, whereas in the U.S. the MM/DD/YY format is used. Consider the date 4/1/14. This date will be interpreted in India as 4 January, 2014, whereas in the US it will be interpreted as April 1, 2014. Avoid any such ambiguities by spelling out the month. For example, write January 4, 2014.

2 Writing the abstract

An abstract is the snapshot of a paper. It tells the reader what he/she can expect from the paper. Hence, write concisely about your findings and their importance. When necessary, also write about what might not be there. Keep it short, on the order of 50 to 200 words. Always write the abstract after completing the rest of the paper. This way you have the clarity of what you put into the paper. Include a short description about your results presented in the paper. Make it clear what new results are in the paper. Otherwise, you might
risk getting the paper rejected, and if it is accepted, the reader might not become interested if he/she does not know what to expect.

It is prudent to avoid math in the abstract as much as possible. You don’t want the reader to get into the details at the abstract level itself. For example, instead of writing “we propose an \(O(n^2)\)-time algorithm for . . .”, write “we propose a quadratic-time algorithm for . . .”. Avoiding math in the abstract, as well as in the title, will aid in the searchability of the paper, as search-engine indexers are not good at indexing typeset maths.

An abstract is only about the paper. Hence, include a citation in it only if it is absolutely necessary, such as, when the work presented in the paper is completely built upon a previous work from another paper. In such an instance, you have to give the complete detail of the reference, not just as a mere citation in the bibliography (for instance, do not put [17] or [CLRS09]). Remember that often readers will be able to read only the abstract free of charge, and putting a citation from the bibliography forces them to look into the bibliography, which is only possible if they buy the paper.

Some journals have certain rules regarding the usage of “we” in the paper. In such cases, there is a good reason to use passive voice as a workaround. Or use a different construction, and in the worst case, avoid publishing in the journal. Do not start the abstract with “In this paper . . .”, or “This paper shows . . .”. It is obvious that the abstract tells what is there in the paper.

3 Critical analysis of an abstract

In class we critiqued one of Tom’s earlier papers called Stupid Columnsor Tricks, which is his joint work with Geeta Chaudhry. We found the following drawbacks in the abstract of the paper:

- There is too much math used in the abstract. Some math can be avoided by using words instead.
- At the end of the first sentence, there is a remark about the mesh: “. . . (so that mesh is tall and thin).” This is an important point and should not have been put in parenthesis.
- The start of the abstract is very direct. Include a sentence or two that builds up the background.

Remember, for every 50 people who read the abstract, only 1 person reads the paper. The abstract should attract the reader to read the whole paper.

4 Writing the introduction

The introduction is the starting place of any paper for an interested reader. The introduction is the section where you set the context of your work. You should outline what is in the paper. You should state the problem, briefly state your approach to the problem, briefly discuss your results, discuss references to key papers if any, and give a brief outline of the sections in the paper. You set the tone of the paper, for example, the introduction will tell if the paper is ponderous or interesting and entertaining. Hence, keep the introduction as short as possible and present it as a narrative, i.e., in story form. Remember, whenever a reader starts reading a paper, he/she starts with an attention capital. The attention capital is like a bank account; the balance in the account will keep the reader going. You do not want this attention capital to drop

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to zero in the introduction itself. Hence, while writing the introduction, always ask yourself: Is this what I want the reader to spend his/her attention capital on?

Note that everything in the abstract should appear somewhere in the Introduction. The abstract and the rest of the paper are often read at different times. Do not be concerned about repeating the same sentences from the abstract, as a little repetition is OK. Repetition is a standard rhetorical device. In general, you can use the following check-list while writing the introduction:

1. Does the introduction set the context of the paper?

2. Will the reader get a brief idea of the work presented in the following sections?

3. Are there any highlights about the important applications of the result?

4. Has the most relevant work been cited in the introduction? For example, an earlier model or an earlier theorem.

Following are a few caveats to be remembered while writing an introduction:

1. Keep as few definitions in the introduction as possible. You do not want the reader to be overwhelmed by too much information in the first section itself. Rather define things when they are required. Keep in mind that readers have a cache memory, too.

2. Avoid subjective remarks such as “…our design is better than xyz…”. If you have a mathematical analysis that proves your results to be better, then mention it. You can also discuss the relative advantages and disadvantages of your results.

3. Keep the introduction short and simple to read.

Always write a rough draft of the introduction first. Writing a rough draft will make you think about the scope of the paper. As you write the rest of the paper, revise the introduction to fine tune it per the above guidelines. You may have to go through a number of iterations of revising the introduction; be ready for that. You can leave aside writing the outline of all sections until the rest of the paper has been completely written.

**Homework:** Download *Stupid Columnsort Tricks* and read the introduction by the next class.

**References**