

EPILOGUE

Being a PhD student for five years, I have spent probably half of my time preparing papers (including writing a draft, revising that draft multiple times, and even rewriting a section or the whole paper). Therefore, this book to show my PhD work would be incomplete without a chapter telling my experiences in writing papers and articles (referred to as paper in the rest of this epilogue). Unlike many courses and books that I had a chance to attend and read, I would not consider writing a paper as a practise-based process, that you cannot learn without actually doing it. I would not either agree that writing a paper is an abstract process which is based on the feeling of the authors. Instead, I think that writing a paper consists of several unspoken rules. If the rules are explained well enough, PhD students can spend less time and avoid hurtful experiences in dealing with this matter. The following sections try to explain these rules in a systematic and the simplest way. Note that the following principles can be regarded as the obvious to lots of experienced researchers, however, to my experience, they are vague to new PhD students.

COMPONENTS OF A PAPER

The component of a paper varies depending on its content, however, these following general rules are applied:

- A paper has five mandatory components: abstract, introduction, main contributions (i.e., methodology, implementation, theory), results, and conclusion.
- In addition, there are various optional components such as related work, discussion, future work.
- These components can be organized into one component per section, or more than one component per section. For example, introduction and related work, results and discussion, or discussion and future work are often merged.

Several crucial points are required in each of the mandatory components, which will be explained in the following sections.

ABSTRACT

An abstract is a summary of the paper; it rephrases each section in the paper in one sentence:

- It starts with a motivation in the introduction, summarizes the contributions, states the results, and concludes with the main message of the paper.

- It is normally the most read section in the paper; hence, a key, strong, and necessary message should be stated clearly here.
- The terms that can only be defined later in the paper, and very specific context-based vocabularies should be avoided in the abstract.

INTRODUCTION

Introduction includes three parts; each part comprises of one paragraph:

- Problem statement: this explains the problem and motivates why the work is essential (i.e., to provide the missing solution for a problem).
- State-of-the-art: this explains what has been done to solve the problem so far, why there are still missing solutions, and what makes the work different/outstanding from current published work. This paragraph first lists generic points from published work, compares it with the proposed work, and states that the proposed work can solve partly/entirely the problem.
- Contributions: this first states the main contributions of the paper/articles, then lists all the detailed points of the paper's contributions. This paragraph can also be linked to the related sections in the paper, unless another paragraph is used to lists the organization of the rest of the paper.

MAIN CONTRIBUTIONS

Main contributions present the idea, implementation, and theory that are proposed in the paper; they are the most important body of the paper:

- The main contributions include one or more sections; each normally links with a contribution mentioned in the introduction.
- The main contributions should be presented from the context of the big picture (i.e., system architecture, general concept) to details (component implementation, proof of concept).
- In articles that are based on a previous published papers, a section to summarize the main ideas and results from the published paper is also required.

PRESENTING RESULTS

Presenting results are normally the key to determine the acceptance of the paper. Hence, an effective presentation should directly reflex the main message from the results:

- There are multiple ways to present results; the most effective way is using visualizations such as graph. Note that there are many types of graphs, therefore, it is essential to choose the right type. For example, if the results focus on presenting percentage of a component, a pie graph should be used; if the results focus on the improvements based on increase data sizes, a bar or lines graph should be used.

- Each number/data used in the graph always has a meaning, and focuses on the message of the result. For example, if the difference is the main message, a number showing the difference between two measurements presents effectively the result.
- Each result/graph always needs description and explanation. The results are first described (i.e., the trend of increasing, decreasing), thereafter, explained (i.e., why such results are obtained).

CONCLUSION

A conclusion is the last message of a paper:

- A conclusion concisely summarizes the contributions of the paper, states the obtained results, and relates to the societal/communal impact of the results.
- Lengthy discussions, new insights, and new terminologies should be avoided in the conclusion.

SECTION, PARAGRAPH, AND SENTENCES

There are multiple ways to write; one way is using the top-down model (i.e., first topic sentence, then details) while the other way follows the bottom-up model (i.e., first details explained, then conclusion sentence). However, several common rules still apply:

- Each section should start with a brief introduction of its main idea and components.
- Each paragraph and sentence only focus on one idea.
- Each paragraph and sentence start with a part related to the previous paragraph/sentence, then introduce new content. That creates a flow in the paper.

WORDING AND FORMATTING

Choosing the language style and words to use in a paper is a personal choice, however, several rules are required to avoid confusion:

- Be simple. Complex and rarely used vocabulary should be avoided in scientific writing.
- Defined before used. Unless the abbreviation is widely understood (i.e., UNESCO), it must be defined at least one time before being used in the paper.
- Introduced when required. Whenever the terms, concepts, or ideas are necessarily used, the author should introduce them, not too early (far before from where it is first used) or too late (after it is being used).

Except for special formatting that is required for each conference paper or article, simple formatting rules always apply:

- Be consistent. For example, if a term is used in the introduction, it must be used throughout the paper; once another term is used, either the new term contains a different meaning and needs redefined, or the new term refers to another concept. Another example is about the section titles or figure captions, some authors use all capitalized letters, or capitalized first letters, or no capitalized letter; they are all correct as long as they are consistently used in the paper.
- All figures, tables, and equations are referenced and explained either briefly or in details.
- Citations are required at any statement that is not derived logically from the current text.

DEALING WITH REVIEWERS

There comes a time when the paper is finished, and sent out to reviewers. After a while, that piece of work that every author is proud of comes back, under the eyes of the reviewers with full of questions, doubts, and mistakes. Here comes a time when you have to deal with reviewers in a professional manner. I quote here the tips from IEEE [Authors@IEEE Newsletter: Volume 3, Issue 10, October 2018] that I totally agree with:

- **Appreciate the opportunity to improve.** It's very easy to feel defensive or discouraged when you receive a long list of suggested edits from reviewers. View the suggestions in a positive light instead by seeing them as opportunities to improve your article before publication. The reviewers and the editor have invested significant time in your article to help you improve it for the scientific community.
- **Respond to every comment.** Copy all of the reviewers' suggestions from the decision letter into a new file and separate them into individual suggestions. This is the basis for your response to reviewers, which will be submitted with your revised article. Read each suggestion carefully, implement the appropriate changes in your article, and then explain each change in the response to reviewers document just below the original suggestion. Keep your responses professional, factual, and concise. If you disagree with a reviewer's suggestion, state that you have not implemented the suggestion and provide your reasons for not doing so in the response to reviewers document. The editor may accept your explanation.
- **Read it again before resubmitting.** Set aside the revised article and the response to reviewers and then return and fully read them both again. You may find additional edits when reading through the documents with fresh eyes. Resubmit to the journal once you are satisfied with the revised article and the response to reviewers.

Preparing papers is an essential process of being a researcher. Writing papers is not only a way to convey the idea to the community, but also a way to shape authors' thoughts and organize the work in a better setting. A set of rules is necessary to create a standard format of the writing process, and to save time and energy of researchers, especially PhD students who are always under stress of publications. I hope they are useful.