A Template for Academic Writing Projects

AntNLP

Abstract

The abstract is a longer version of the title, and a shorter version of the introduction (which is a shorter version of the whole paper). A common abstract section contains

- the research problem (one sentence),
- the challenges (one or two sentences),
- the approach (one or two sentences),
- the contributions (one sentence),
- experimental results (one or two sentences).

1 Introduction

The introduction section is the most important part in your writing. You may think that it is the compass which guides the tired readers to see the light of your paper in the field. And you may also put yourself in the position of a tough reviewer, and ask how you would judge the paper after going through this section.

In general, the introduction tells a story about your research problem: how it comes out, why it is worth studying, where is its position in a bigger picture, how you figure out your solutions etc. Typically, it contains

- one paragraph on the problem's definition and its background. Why it is an interest and important problem to investigate?
- one or two paragraphs on challenges. What makes your problem hard? Why naive solutions fail? What are ignored aspects in previous solutions?
- one figure/table/example to illustrate the challenges, the failure of existing systems, the differences to previous methods etc.
- one or two paragraphs on your solution. How your method different with previous ones? Why it is able to better tackle the challenges?
- one paragraph on experimental results. On which datasets you test your system? How about the results? Do they demonstrate the advantages of your solution?

- one paragraph summarizing contributions in bullet form.

Writing a good introduction is hard. According to our practice, some tips may help you accomplishing it (also applied to other sections),

- the coarse-to-fine strategy: for each paragraph, writing a piece of note on what should be mentioned in it. After doing this for all paragraphs (now you should have a big picture of your story), you can fulfill each paragraph by thinking about how to write the first/second/.../last sentence to cover contents in the paragraph note, and then you could start to organize words.
- the first and the last sentence of a paragraph are important. Usually, they should reflect the main topic of the paragraph and connections with previous/next paragraphs.
- to be well-organized, you may consider inserting conjunctions: they could make the underlying logic of texts more explicit. (e.g., however, but, although, even, besides, despite, furthermore, on the one/other hand ...)

2 Related Work

The related work section, which usually has an underestimated importance, is not simply a bunch of citations and loosely organized descriptions. A well-written related work gives plenty of insights on what have happened in the field. For experts, it should reveal key technical differences between your solution and prior efforts. For newcomers, it should tell a brief story on the background and connections with other tasks.

One common practice is to organize related work into different groups. You may consider

- different definitions of the problem (e.g., for reading comprehension tasks, there are cloze test, multiple choice and directly extracting answer spans).
- different models (e.g., pipeline/joint model, fully/weakly supervised, local/global model, domain specific/independent...).
- different key components (e.g., w/o external knowledge, w/o specific preprocessing...).

Instead of giving a thorough survey, you shall focus on those work closely related to your paper. For example, if your approach is supervised, you may emphasize related supervised models, and briefly mention (or just ignore) unsupervised/semi-supervised methods. Again, a coarse-to-fine strategy could be applied: you can first decide the groups, then list important papers in each group, and then describe individual papers.

A final remark on writing related work is the usage of `citet` and `citep` [1]. We suggest that instead of

> [Miwa and Sasaki, 2014] proposes a joint model...

you use

> Miwa and Sasaki [2014] propose a joint model...

One correct usage of `citep` is

> We compare our model with the joint model proposed in [Miwa and Sasaki, 2014].

3 Approach

The approach section contains models, algorithms, system descriptions, and theorems. They are almost technical materials. However, it doesn't mean you only need to describe the formulations and models. Illustrating the rational behind them is more important. Why you design your model this way? What are alternatives and why you don't choose them? What are advantages and drawbacks of your solution? At the same time, it is important to echo the statements in the introduction section (i.e., challenges of the problem, advantages of your approach etc). Remember that **every section of your paper should tell a story**.

The approach section could contains

- a subsection on problem/task definition,
- an (optional) subsection on preliminary models/algorithms,
- subsections on your models.

Usually, you need two key supporting components in the approach section, symbols and figures.

3.1 Symbols

Please remember that symbols are used to make the paper easier, rather than harder, to digest. Thus, the first principle on the symbol system is **"the simpler the better"**. For example,

- *when it's possible to use natural language, you may prefer not to use symbols.* For example, "if a word is not in the vocabulary" is better than "if $w \notin V$".

[1] In package natbib

- *when it's possible to reuse an existing symbol, don't define a new symbol.* For example, if a sentence is denoted by s, you may use $|s|$ to denote its length rather than a new symbol n. If the ground truth class label is y, you would prefer y', rather than a new notation z, to represent other class labels.

A good symbol system has three properties,

- **Clear**. The meaning of every notation should be defined, and there should be no conflict/ambiguous usage. Common mistakes include
  - using one notation to represent different things (e.g., w refers to both a word and a weight vector),
  - using notations without definition,
  - defining a notation but never use it,
  - using inconsistent typesetting (e.g., w or $\mathbf{w}$).
- **Informative**. Like good variable names, informative notations could make your reader's life easier. For example, the leading character is a good notation for naming an object (a sentence s, a word w, an entity *ent*). You may also consider relations among different notations (e.g., using coherent symbols for related objects ("a vector v in a set V")).
- **Conventional**. Commonly, upper case letters represent sets, matrices, and lower case letters represents scalars, indices. Following the convention may reduce the risk of misunderstanding. Meanings of some notations may also have strong prior. For example, "d, δ, Δ" usually imply "differences", and "z" usually stands for unobserved variables in inference models.

3.2 Figures

Please make figures accurate, consistent with texts, and beautiful.

4 Experiments

The experiments section shows empirical evaluations of the proposed solution. Again, it's not enough to just list the results. You need to discuss them and show their implications. For example,

- motivations behind experiments (why you run such experiment?)
- reasons behind the success and failure of solutions.
- limitations of the current experiment configuration and possible improvements in future work.

Typically, the experiment section contains the following parts,

- a subsection (paragraphs) on describing the evaluation environment, which includes
  - datasets (statistics, train/dev/test split, etc).
  - criteria (e.g., when judge a correct entity in an entity detection task, specifying "exactly match" or "overlapped match", whether you consider entity types, etc.).
  - default settings of your models.
  - hyper-parameters (may go to the supplementary)
- a subsection on baselines, including short summaries of their models (echo the introduction/related work section) and the reasons you choose them for comparison.
- a subsection on results and discussions (the main part).
- a subsection on error analysis (for empirical methods) which gives concrete examples to illustrate pros and cons of your model.

5 Conclusion

The conclusion may contains

- the research problem (one sentence),
- summaries of your approach (one or two sentences),
- experimental results (one or two sentences),
- possible improvments and future work (one or two sentences).

Acknowledgement

Please thank anyone who contributed to your work (discussed the idea and implementation, reading your drafts, providing data, providing research founding etc.) This section should be empty during a double-blind review.

References

Makoto Miwa and Yutaka Sasaki. Modeling joint entity and relation extraction with table representation. In *Proceedings of the 2014 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, pages 1858–1869, Doha, Qatar, October 2014. Association for Computational Linguistics. URL `http://www.aclweb.org/anthology/D14-1200`.