

INSTITUTION

COURSE

DOCUMENT

Latex Report Template

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Abstract

The abstract should typically be a few sentences on what you did. Usually in the style: "In this work we propose/we investigate ...". Generally you quickly contrast (one sentence) what has been done before and what you offer. You ideally describe what data you used, if you show improvements or not, and any other important findings. End with some conclusive sentence (e.g. this bodes well for, we concluded that this is a good approach) should be some kicker. Basically the whole abstract sells your paper, it should be an elevator pitch of your research.

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1 Introduction

It's best to see the introduction as a "triangle" shape in terms of specificity of the subject. You immediately want to start working on describing both the societal and scientific relevance of the paper (usually, but not always in that order). Recently, Nowadays, Since, etc. are easy starters but are heavily overused. Try to make your story more specific with every paragraph, and be sure to have one thread through all of the sentences/paragraphs, it should be a logical flow of zooming in on the material that will eventually bring you to your research question/contributions. While doing so, towards the end, you should be extremely specific about what you are going to do, you set the reader up with required information for grounding the subject, and understanding what your thought process was towards setting up the research, so that they know what to expect. Any citations along the way should include "related but different" work, or some very important papers that gave rise to the work that you are doing here. Make sure that you state a hypothesis (or a research question, alternatively), this helps you think about the experiments required to test this hypothesis. Some papers list the contributions their works offers as bullet points as an ending, this is somewhat of a stylistic choice. The standard questions should at least be clear at the end: what are you doing, why are you doing this, what data are you using, what techniques, what will your experiments demonstrate, what can we learn from that, and so on.

2 Theory

By now you have introduced all concepts you'll be working with. Time to acknowledge all prior work on this topic, which generally always include a brief historic overview. Note that this includes work on tasks that are similar but not exactly the same as the work that you are doing. Note that this should be related by topic, not technique (as that could blow up very quickly)! A good theory section draws interesting relations and provides a structured overview of the logical progression of all the task's research. You should be able to identify key methodologies, contrasts in approaches, and work towards specifying the research gap you will be addressing with your work. Try to refrain from giving full method section descriptions of all the work that you cite here, typically a core description per piece of related work is enough. Only the very related work deserves a more complete explanation, especially if you will be borrowing some of this methodology. A good strategy for forming an extensive bibliography is to start with the most recent papers on a task, and seeing which are the early papers that they cite. Look those up and see if those cite even earlier work. At some point, you'll hit somewhat of a "beginning" of the field. Try to identify which are the papers with the most impact (say well over 50 citations) and for those with the most impact, look at the "cited by" sections in either google scholar or semantic scholar. This might help you identify papers that are related, but might be difficult to find within the range of queries you can come up with.

2.1 Citations

Citations in parentheses are declared using the `\citep{}` command, and appear in the text as follows: This technique is widely used (Woods, 1970). The command `\citep{}` (cite parenthetical) is a synonym of `\cite{}`. Citations used in the sentence are declared using the `\citet{}` commands, and appear in the text as follows: Woods (1970) first described this technique. The command `\citet{}` (cite textual) is a synonym of `\cite{}`.

Citation commands are based on the `natbib` package; for details on options and further variants of the commands, see the `natbib` documentation.

3 Methods

Now comes the "beef" of the paper, where you explain what you did. Again, organize it in paragraphs with titles. As in every section you start with a very brief overview of the section. This section may vary significantly depending on your topic. You may also choose to make the different parts individual sections. Here is a more general structure:

3.1 Design

Concisely present your design. Focus on novel aspects, but avoid implementation details. Use pseudo-code and figures to better explain your design, but also present and explain these in the text. To assist in evaluating your design choices, it may be relevant to describe several distinct *design alternatives* that can later be compared.



Figure 3.1: Figure example.

3.2 Analysis

Argue for the correctness of your design and why you expect it to perform better than previous work. If applicable, mention how your design relates to theoretical bounds.

3.3 Optimization

Explain how you optimized your design and adjusted it to specific situations. Generally, as important as the final results is to show that you took a structured, organized approach to the optimization and that you explain why you did what you did. Be careful to argue, why your optimization does not break the correctness of your design, established above. It is often a good strategy to explain a design or protocol in stepwise refinements, so as to more easily convince the reader of its correctness.

$$e = mc^2 \tag{3.1}$$

3.4 Implementation

It is not necessary to "explain" your code. However, in some cases it may be relevant to highlight additional contributions given by your implementation. Examples for such contributions are:

- *Abstractions and modules*: If your implementation is nicely separated into interacting modules with separated responsibilities you could explain this structure, and why it is good/better than some other alternative structure.
- *Optimization*: If you spend significant time optimizing your code, e.g. using profiling tools, the result of such optimization may be presented as a contribution. In this case, reason, why the optimized code works better.
- *Evaluation framework*: If you implemented a framework or application to evaluate your implementation against existing work, or in a specific scenario, this framework may be presented as a contribution.

```
def hello():  
    print("Hello World!")
```

Listing 1: Code example.

Make sure to cite all external resources used.

4 Results

In addition to what's described in the guidelines, make sure to provide *compact* information. Let's say I ran many many different parameter settings, ideally you only want to show the versions of your models that scored highest overall (so classifier + parameter settings). Maybe you might want to compare between classifiers, but generally only when that's useful. See Table 4.1 for reporting different pipeline settings. Note that the import numbers (highest per column) are bold for quick lookup. This is also the general table style you should try to adhere to (nicely APA). For figures, at least export to PDF or something that scales (SVGs work poorly in L^AT_EX). This is also the part to include post-hoc analysis. Make sure that it's clearly separated from your main results though!

Statistic	Variable A	Variable C	Variable C
N	13000	13000	13000
Mean	50.000	50.000	50.000
St. Dev.	1.5	1.5	1.5
Min	14.075	14.075	14.075
Pctl(25)	49.000	49.000	49.000
Pctl(75)	54.000	54.000	54.000
Max	60.000	60.000	60.000

Table 4.1: Table example.

5 Conclusion

The conclusion is a short list of what you did, what the most important findings were, and what the most important implications are. Not much more to add than the guidelines here you can view it as a compression of the last part of your introduction and discussion. Your abstract should be an even shorter version of the conclusion.

Bibliography

Woods, W. A. (1970). Transition network grammars for natural language analysis. *Communications of the ACM*, 13(10):591–606.

A Appendix A

Here is the appendix. You can put anything you want here, with or without descriptions, and can refer to the sections by labelling them. Appendix A.