**A Guide on Master Thesis Proposal**

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（adapted from <https://mitcommlab.mit.edu/meche/commkit/thesis-proposal/>）

This guide is intended for crafting a master thesis proposal. Though the general idea can be applied to PhD. thesis as well.

**1. A strong thesis proposal…**

1. **Motivates** your project and introduces your audience to the state-of-the-art for the problem you’re working on.
2. Explains the**limitations** in the current methods through literature review and/or original analysis. This should also explain why the limitations matter and why they’re the right ones to focus on.
3. Clearly explains your **technical approach** to make specific improvements to (a specific) part of the field.
4. Uses original analysis and literature to support the**feasibility**of the approach.
5. Describes **what is original**about your work.
6. Provides a practical **outline for completing this research**: a timeline laying out quantifiable hypotheses, experimental/numerical/theoretical techniques, and **metrics for evaluation**.

Most of you may not have a detailed technical approach flushed out for #3 and #4. As this usually requires that you have already studied the problem background in depth or done preliminary experiments on your problem.  If you are less prepared, try to think about what specific things you can do to get more prepared (e.g. implement a baseline method, solve a simplified version of the problem, or do more focused literature study on a particular category of approaches. ) Try narrow down as far as possible.

**2. The proposal body**

references

introduction

Related works

Timeline

Proposed work

**2.1 Introduction**:

Provide only the necessary information to motivate your research, and show how it fits into the broader field. What is the problem you are trying to solve? By the end of the introduction, your audience should understand the basics of **what** you will do and **why** you will do it.

**2.2.Related works:**

Describe the current state of the art and related research fields in sufficient technical detail. The goal is provide just enough detail to give the reader a sound understanding of the limitations and the need for new work. **Do not go into detail that does not directly help in understanding *your* problem.** You are not trying to make your reader understand everything about the topic or demonstrate how much you know.

**2.3 Proposed work:**

Explain **how** your work will solve the problems that you have identified. How will you **address the objectives above**? Provide enough **technical specificity** to leave the reader with a firm grasp of **what** you will do.

This is also the place to write about **preliminary studies and experiments**. This material will demonstrate (partially) why your proposed method is feasible. If you have preliminary results, you should also describe the gap between that results and your expected result. List any technical challenges that still need to be resolved.

**2.4 Timeline/Milestones**

Provide a set of time-structured goals and deliverables. You should make the plan for about 1.5 years. (Depending on whether you will do an internship or travel for job interviews in your third year.)

**2.5 References**

This is a standard section listing 10-30 references in an appropriate format. As in a real paper, these references should be cited in this proposal, not just a list of papers that you have read.

**3. Important Tips**

**3.1** **Aiming for a general audience.**

Imagine your audience are other Lab 2C professors who are knowledgeable in the general area of machine learning and information science, but may not be an expert in your specific topic. Your audience is always looking to answer the questions: “what is this research, how will you perform it, and why does it matter?” Therefore, you need to give enough background information on your problem and familiarize your audience with any terminologies that you are using.

**3.2 How to start the Introduction?**

Start the introduction on point. Your research may be addressing a specific problem in a particular research field. It is important that your introduction (including problem motivation, challenge etc ) is focused on that specific problem, without spending much words reviewing the research field in general. e.g. Suppose your problem is classifying videos for emotion recognition, you should start by discussing the importance of emotion recognition through videos rather than starting with advances in video processing technology.

**3.3 A single research objective**

Prior to the proposal, you may have explored several related research questions/hypotheses. You may have experimented several methods for the same problem. However, in the proposal, you should select a single research objective. Then write the proposal with the selected objective **as if you have done nothing else**. Information or experiments not directly supporting the objective should be skipped. Remember that the readers don’t need to follow your steps of how you come up with the research idea, they only need to learn your idea in the most straightforward way.

**3.4 A strong motivation for your proposed method**

When writing a proposal or a paper, you always need to motivate your proposed technical approach (#3).

I noticed that many of you are working on an algorithm problem. (e.g. design a new method for some existing problem.) Suppose you aim to solve problem Y. Here are examples of **bad** motivations for algorithm & machine learning papers:

* We tried methods X1, X2 and X3 and found X3 is the best one.
* Nobody has yet applied the X method to the Y problem. (X is a generic/popular method that could solve problems similar to Y.)
* X has been used before to solve the Y problem. Z is the state-of-the-art improvement of X for some other problems. Therefore, we apply Z on Y.

These arguments are **not sufficient** to motivate your technical approach. You need to convince the reader how your proposed method can sufficiently **address particular technical challenge(s)** of Y **better than other alternatives**.  i.e., You need to tie in the limitation of existing approaches.  Also beware of the following logic fallacy: “Existing methods for problem Y are limited **because** **it does not use/consider X**.” This is NOT a proper limitation since it doesn’t explain why the lack of X can cause a problem.