I hear & I forget.
I see & I remember
I do & I understand } confucius

GUIDELINES FOR WRITING THESIS RESEARCH PROPOSALS

William B. Thompson

Department of Computer Science
University of Utah
Salt Lake City, UT 84112

Dept of Computer Science, University of Karachi.

Introduction

This note outlines the material that should be included in thesis research proposals. While a particular format is suggested, the actual organization is not as important as is including all necessary information. In addition, it is vital that the proposal be clearly and concisely written, attract the attention and interest of its intended audience, and demonstrate your understanding of the proposed project.

Make sure you answer the following questions:

- *What is the problem being addressed?*
- *Why is the problem significant?*
- *What strategy is being proposed for attacking the problem?*
- *Why is this a good strategy?*

The Thesis

A thesis needs to have a **thesis**. That is, you need to clearly put forth a proposition for solving some interesting problem. It is often quite difficult to organize ideas into a clear thesis. One aid to the process is to summarize your proposal in a single sentence. This sentence should focus on the idea, not just the problem. For example, *"the stereo correspondence problem can be solved using hierarchical matching"* is appropriate (though not original), while *"the stereo correspondence problem"* is not. Including some form of this one-sentence description in the abstract and/or introduction will help to focus the attention of readers towards the key points in your proposal.

The Proposal

Abstract

A brief summary of the proposal. A few sentences should be included on each of the following: The nature of your problem, why it is important, the objectives of your proposed research, the methodologies to be used, and what you hope to accomplish. It is crucial that the abstract clearly state the nature of the research. If you cannot outline your project in a few sentences, you probably don't understand it very well.

Introduction

A few paragraphs briefly describing the problem you are addressing and the research being proposed. The introduction is not a summary, so do not duplicate the abstract. This is the point in the proposal were you must convince your audience that you are dealing with an interesting problem

and that you have defined that problem sufficiently precisely that there is a reasonable expectation of results. The opening paragraph should elicit the reader's attention and interest without (unnecessary) hyperbole. (It is difficult to impress readers with terms such as *critical problem, breakthrough, or definitive study*.)

Objectives

A few paragraphs stating as directly and succinctly as possible the goal(s) toward which the research is directed. These goals should be of a scope consistent with the time frame and level of effort appropriate to thesis work. Thus, neither *study operating system performance* nor *determine the the performance change due to system patch xyz* is likely to be appropriate. The important point is that somewhere you indicate that you have a set of well thought out objectives that will guide the conduct of the research. A lack of sensible and precisely described objectives is a common defect in proposals. You should not spend time on the details of your project until you have an understanding of the goals of the research! (Objectives are often included with the introduction instead of in a separate section).

Background

The background section should include a review of previous work that has been done on the topic and its current status as a research and conceptual problem. The literature review should organized previous work into sensible categories, not just provide a listing of potentially relevant papers. The review need not be exhaustive. Whatever is included should be pertinent, correct, and demonstrative of your knowledge of the field. Overly long literature reviews are often an indication that the writer does not really understand the problem with which he is dealing.

Proposed work

This is the main body of the proposal. A variety of organizations are possible, but all should contain the following information. (In a reasonably short proposal, these points are usually not placed into separate subsections.)

Computational theory

Much of the research in computer science either explicitly or implicitly presumes some particular high-level model of computation. These *computational theories* describe the goals of computations and the logical strategies by which the goals can be achieved. What computational theory underlies this research problem? Does the research involve the development of a *new* computational theory for some process? What is the relationship between your computational theory and the algorithms and processing architectures necessary to implement the theory?

Specific aims

A brief but specific list of tasks to be undertaken and goals to be sought. This should serve as an outline of the proposed research activities, giving fairly discrete and specific steps to be accomplished. This section should demonstrate not only that you have defined your problem well, but that you have a clear understanding of how to attack it.

Rationale

Why should this research be done at all? Why should it be done in the way being proposed? A rationale section provides an investigator with a chance to justify what it is he wants to do and the ways proposed to do it. Rationale sections become increasingly important when there are a variety of ways to attack a particular problem and no consensus on which choice is best.

Methodology

A description of what you intend to do to solve your problem. This should be integrated with the list of specific aims, but in general should be both more complete and more procedural. Readers usually want to know both what is going to be done and how it is to be done. The appropriate level of detail is often difficult to determine. You must provide enough information so that the reader know you have thought through your problem and have already developed an approach with some reasonable chance of success. On the other hand, excessive detail will not be read. (e.g., avoid proofs and other similar tedium.)

Evaluation

It is crucial that you indicate the way in which the work can be effectively evaluated. What criteria need to be satisfied for the research to be successful? How can we tell that these criteria have been met?

Summary

A summary section is not necessarily needed for most proposals. If included, it should focus on the significance of the research, rather than just duplicating the abstract and introduction.

Bibliography

A list of all references used in the main body of the proposal.