Your Amazing Thesis Title Goes Here

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A thesis submitted to McGill University in partial
fulfillment of the requirements of the degree of
Doctor of Philosophy

Abstract

Official McGill Guidelines: If the language of the thesis is neither English nor French (only allowed for specific language Units) then a third abstract in the language of the thesis is required.

Abstracts in English and French are mandatory and must be text only, i.e. no images, special characters (apart from the West European character set excluding the "Œ" and "œ"), chemical or mathematical formulae, or special formatting (e.g. lists, tables). Abstracts have a maximum limit of 4000 characters.

Abrégé

Official McGill Guidelines: La même chose en français.

Contribution

Official McGill Guidelines: A doctoral thesis must clearly state the elements of the thesis that are considered original scholarship and distinct contributions to knowledge.

- Contributions of the student to each chapter must be explicitly stated.
- Contributions of any co-authors to each chapter must be explicitly stated.

Acknowledgements

Official McGill Guidelines: Among other acknowledgements, the student is required to declare the extent to which assistance (paid or unpaid) has been given by members of staff, fellow students, research assistants, technicians, or others in the collection of materials and data, the design and construction of apparatus, the performance of experiments, the analysis of data, and the preparation of the thesis (including editorial help).

- In addition, it is appropriate to recognize the supervision and advice given by the thesis supervisor(s) and advisors.

Contents

List of Figures

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Introduction

Official McGill Guidelines: Clearly state the rationale and objectives of the research.

Literature

Official McGill Guidelines: : The comprehensive review of the literature must sufficiently demonstrate the student's knowledge of and expertise in their research areas and should be broad enough to apply to each research question in the thesis. The review of the literature can additionally include various types of content, such as:

- A review providing a reader who is relatively less familiar with the research topic (e.g., an internal/external member of an oral defence committee with adjacent but not direct expertise) an introduction to the general domain.
- An explanation of the overall rationale for how and why the subsequent studies were conducted. For example, the literature underlying the research questions must be sufficiently discussed.
- A review of fundamental theories underlying the subsequently presented work, or to explain why certain approaches were not taken in the study(ies) presented.

The literature review must be in line with disciplinary expectations. The review can be incorporated in the Introduction chapter, addressed in a standalone chapter, or distributed across multiple chapters.

1

Formal Language Theory

In computer science, it is common practice to conflate two distinct notions for a set. The first is a collection of distinct objects sitting on some storage device. The second is a lazy construction: not as an explicit collection of objects, but a representation, that, when coupled with some computational resource, allows us to efficiently determine the members of the set as needed. This second allows us to represent infinite sets, without requiring an infinite amount of memory to store them. Inclusion then, instead of being simply a lookup query as in the first case, becomes a decision procedure. This is the basis of formal language theory, which is the study of sets of sequences defined by a representation.

The representation we are chiefly interested in are grammars, which are a common metanotation for specifying the syntactic constraints on programs, shared by nearly every programming language. Grammars are generally overapproximations to the language, providing a fast procedure for rejecting invalid programs, but requiring additional semantic analysis to decide inclusion.

Like sets, it is possible to combine grammars using set operations. This allows us to perform operations like union, intersection, and difference on languages. These operations are useful for combining syntactic and semantic

properties of programs. For example, we might have two grammars, representing two properties that are both necessary for a program to be correct. Then we can encode all the programs that satisfy both properties by intersecting the two languages.

2

Program Repair

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Probabilistic Program Repair

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Discussion

Official McGill Guidelines: The discussion of findings must be in line with disciplinary expectations. A comprehensive discussion is expected to be a minimum of 10 pages, double-spaced for doctoral students and a minimum of 5 pages, double-spaced for Master's students (including figures, images, and tables). It pertains to the entirety of a thesis. The discussion of findings should provide an final, overarching summary of study themes, limitations, and future directions.

In the case of a manuscript-based thesis, the comprehensive discussion should encompass all of the chapters of the thesis and should not be a repetition of the individual chapters. This section can be used to address issues not sufficiently covered in the preceding chapters or papers (e.g., critiques raised by reviewers that could not be incorporated into published works, or reintroducing discussion arguments removed from published papers upon reviewer request). This section can also be used to elaborate on the practical/applied aspects of published findings in a manner that is more accessible to less expert readers.

5

Conclusions and Future Work

Official McGill Guidelines: Clearly state how the objectives of the research were met and discuss implications of findings.

Publications

This part is optional, but it gives a nice touch to list all the publications (official venues down to poster sessions) throughout your PhD.

Keep this in the same style as publications in your academic CV: Conference / Year - Title - Authors. And here comes a sample ref for the bibliography: [Con23]

Acronyms

This part is likewise optional. But it does not hurt to provide a list of all acronyms, e.g.:

- **REST**: **Re**presentational **S**tate **T**ransfer

Bibliography

[Con23] Breandan Considine. A pragmatic approach to syntax repair. In *Companion Proceedings of the 2023 ACM SIGPLAN International Conference on Systems, Programming, Languages, and Applications: Software for Humanity*, pages 19–21, 2023.