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Dear President Feeley and esteemed members of the Jury,

Thank you for your highly constructive feedback on my Master's thesis, originally submitted for review on the 31st of August, 2019.

In response to your written comments dated the 5th of November, 2019 and after close consultation with my advisors, I am pleased to enclose a new manuscript, which includes the following revisions in decreasing order of significance:

- Expanded experimental validation (Chapter 4)
  - Clearly separate our contribution (§4.2) from prior work (§4.1)
  - Comparison of adversarial efficiency with random baseline
  - Formalized problem statement and proposed approach
  - Visual aides demonstrating adversarial attack
  - Validate code samples to ensure compilation
- Minor DSL updates and discussion (Chapter 3)
  - Clarify where our DSL falls on the Chomsky hierarchy (§3.6)
  - Kotlin $\nabla$  implements *symbolic differentiation* (§3.17)
  - Add support for heterogenously ranked expressions (Tab. 3.2)
  - Describe terminology used in feature comparison (Tab. 3.3)
  - Improve notation for type-level arithmetic (§3.8)
- Revised conclusion and summary of contributions (Chapter 6)
- Updated formal grammar and matrix notation (Appendix A)
  - Include Backus-Naur form grammar for Kotlin $\nabla$  (§A.1)
  - Describe polynomial regression algorithm (§A.3)
  - Minor notational improvements

- Miscellaneous minor revisions (Chapters 1-5)
  - Additional discussion of prior and future work
  - De-emphasize the connection to robotics development
  - Fix various clerical and grammatical mistakes
  - Add missing citations to relevant literature
  - Update code samples to fix syntactical errors
  - Added internal and external hyperlinks

I wish to again thank my advisors, Dr. Paull and Dr. Famelis, whose guidance and encouragement have been integral to the construction of this thesis.

Thank you once again for your time and consideration and please do not hesitate to contact me with any questions or comments. I look forward to your reply.

Sincerely,

A handwritten signature in black ink that reads "Breandan Considine". The script is cursive and fluid, with the first name "Breandan" and last name "Considine" clearly legible.

Breandan Considine

P.S. For a complete list of revisions, please refer to the following URL:  
<https://github.com/breandan/kotlingrad/compare/master@%7B2019-08-31%7D...master>.

encl: Revised Thesis, *Programming Tools for Intelligent Systems*