CISC 499 Undergraduate Project Proposal, November 4, 2020

For: Prof. T. Hu & Prof. J. Dunfield

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# Compact and interpretable predictive models for linear genetic programming

The components of this project are mainly contributed by algorithm design, implementation and presentation. The project will investigate a predictive model and develop algorithms to simplify it without affecting the output of the model. The predictive model we will focus on is linear genetic programming which is an ML and evolutionary computing technique.

The project is intended to make the instructions of linear genetic programs more concise and shorter so that some biased machine decisions can be avoided. The shorter results will make the representation of the ML models more interpretable and easier to evaluate. Meanwhile, the algorithm contributes to the reduction of computation overhead. The algorithm will be implemented with python, and what we need to deal with is to remove useless instructions while keeping the same function as the original predictive model.

The initial draft includes the outline and steps of the project, including the draft for algorithm design, program implementation, presentation and reports. The algorithm design draft will cover a part of the optimizations, and try to apply them to the program, which demonstrates the basic idea of the modification; and we will test the algorithm before finalized. The program draft will focus on a part of optimization algorithms instead of considering other techniques or the combination of them. The presentation draft will summarize the key ideas of the project, and the report draft will describe the main process and results of the project.

The final work is the improvement of the draft work, which includes the optimized algorithm, complete implementation of the algorithm, and the final presentation. The final version of the algorithm design will consider more optimization

methods and the combination of them, the final version will be finalized after the program being tested and performing properly. To achieve the final program, the draft version will be modified and consider more ways to optimize so that it can reach the best result. In the end, the final poster and reports will be improved and completed.

**Important Dates**

January 25, 2021- Research and Algorithm Design Draft

Feb 11, 2021 - Final Algorithm Design

Feb 28, 2021 - Initial Program Draft

March 20, 2021 - Program Final Work

March 24, 2021 - Poster Rough Draft

March 28, 2021 - Final Poster

TBA - Presentation

April 5, 2021 - Report Rough Draft

April 9, 2021 - Final Report

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