

Project Proposal
CSEE 4840
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Genetic Algorithm Accelerator (GAA)

Genetic Algorithms are a class of search algorithms inspired by biological evolution. They use techniques such as mutation, recombination and selection upon a sizable population of individual solutions, using some criteria to determine the fitness of the solutions. This population evolves through a number of generations until a satisfactory solution is obtained or the population evolves too slowly to continue. Generally, genetic algorithms benefit from larger population sizes (to maintain diversity) and longer runtimes (more generations thus more potential solutions). So efficiency is desirable when running genetic algorithms. We want to design an accelerator to run a genetic algorithm efficiently.

Much of the genetic algorithm is parallelizable. Mutation and recombination can generally be run on each individual in the population simultaneously and other techniques, such as maintaining and evolving multiple separate populations allow further opportunity for parallelization. Additionally, depending on the application on which the algorithm is used, there is opportunity to accelerate problem-specific parts of the genetic algorithm. For example, if we were evolving analog filters, we could optimize the algorithms used to determine how close an evolved filter's characteristics are to the desired filter characteristics.

We have not decided on what specific genetic algorithm we want to use for the project but have a couple ideas.

- Analog circuits
- Symbolic regression
- Traveling salesman problem