**Project Proposal**

* **Scripture**

“Be determined in one mind and in one heart, united in all things…” 2 Nephi 1:21

* **Abstract**

The purpose of this project is to learn more about Artificial Intelligence. I want to develop a program that can learn how to beat a computer game. The main algorithm that was of interest to me to learn was about Genetic Algorithms. That is what I want to use to help the program learn how to beat the program.

* **Background**

1. This caught my interest mainly because of the concept. How you can take a population and give all the individual “species” a score. Whoever wins the minimum score gets to “survive” the test. Those will mutate to create new “species” are then all put to the test. Only the best will survive. That concept was really interesting to me of how the population learns how to survive the tests. This lets the program to learn how to beat the computer.
2. Here is some links that I have pulled up to learn more about genetic algorithms:
   1. <http://geneticalgorithms.ai-depot.com/Tutorial/Overview.html>
   2. <http://www.doc.ic.ac.uk/~nd/surprise_96/journal/vol1/hmw/article1.html>

These were the main websites that helped me to learn how to program a Genetic Algorithm.

1. Prior work that I had to finish was get the game up and running. The game is like asteroids but instead it involves gravity with all the objects. The main idea is that the ship has to dodge all the objects and get to the destination.

* **Description**
  + This project will encompass the Genetic Algorithm and the video game I created. The algorithm will find the best way to navigate the game and get the best score it could possibly get for the scenario. The algorithm will build the weights and the network for the Neural Network. The Neural Network will control a ship and it will navigate past the asteroids and planets that will be in the way of the ship. The goal is for the ship is to get to the finish line with the least amount of distance, using the least amount of fuel, and as fast as possible.
  + Success for my project is when it gets the best score and beats 90% of humans playing the game.
  + Tasks
    1. Finish Video game
       - This one is almost finished I just need to add some things to the actual game. Mainly creating a score based off of what happened during the game.
    2. Preliminary research and proposal preparation
       - This will involve understand Genetic algorithm and creating a proposal for what I want to do.
    3. Research
       - Research more of ways of how I can implement Genetic algorithms for my project. Finding examples of code online.
    4. Submit Requirements
       - After all the research, create the requirements that are necessary for the project.
    5. Design, this will involve three subtasks
       - Design: Neural Network, this will control the game.
       - Design: Genetic Algorithm, this will build the Neural Network with the weights given.
       - Design: Interactions with the game. Design how everything will interact the video game.
    6. Code, this will involve three subtasks
       - Code: Neural Network
       - Code: Genetic Algorithm
       - Code: Put everything together with the video game code.
    7. Create test suites, this will involve three subtasks
       - Test code: Neural Network, make sure that it is working like it should.
       - Test code: Genetic Algorithm, make sure that the algorithm is creating the Neural Network correctly.
       - Test code: Make sure that everything is working together correctly. Also start testing to make sure that it is starting to evolve and get better.
    8. Above and beyond
       - Create threads on the project to make it find the solution faster.
       - Have game be able to solve other levels in the game.
* **Scope**
  + Included
    1. The video game
    2. Genetic Algorithm.
  + Not Included
    1. I may try to have my program run on threads to speed up the process. This will split up the tasks. This will be an addition to the project.
* **Tasks and Schedule**

|  |  |  |  |
| --- | --- | --- | --- |
| Task | | | |
| Start Date | End Date | Task | Duration (days) |
| 4/18/16 | 4/21/16 | Finish video game | 3 |
| 4/18/16 | 4/20/16 | Preliminary research and proposal preparation | 2 |
| 4/22/16 | 4/27/16 | Research | 5 |
| 4/27/16 | 5/7/16 | Submit Requirements | 10 |
| 5/7/16 | 5/12/16 | Design Neural Netowrk | 5 |
| 5/12/16 | 5/23/16 | Design Genetic Algorithm | 11 |
| 5/23/16 | 5/31/16 | Design interactions with game | 8 |
| 5/31/16 | 6/4/16 | Code Neural Netowork | 4 |
| 6/4/16 | 6/18/16 | Code Genetic Algorithm | 14 |
| 6/18/16 | 6/25/16 | Code: Integrate algorthim with game | 7 |
| 5/31/16 | 6/4/16 | Create test code for Neuarl Network | 4 |
| 6/4/16 | 6/18/16 | Create test code for Genetic Algorithm | 14 |
| 6/18/16 | 6/25/16 | Create test code for interactions of Algorithm. | 7 |
| 6/25/16 | 7/16/16 | Above and beyond | 21 |

* **Deliverables**
  + Design Document
  + Source Code
  + Test Code
* **Applicability**

I took a class called Machine Learning and Data Mining that learned about Artificial Intelligence. I wanted to go more deep into this topic by learning more about Genetic Algorithm. This is an Algorithm that I did not learn from that class and I wanted to see if I could make my computer learn to beat a game. I wanted to dive deeper in this machine learning algorithm.

* **Required resources with Costs**
  + My laptop
  + Sublime Text Editor
  + G++ compiler
* **References**
* Genetic Algorithms Overview, <http://geneticalgorithms.ai-depot.com/Tutorial/Overview.html>
* Genetic Algorithm, <http://www.doc.ic.ac.uk/~nd/surprise_96/journal/vol1/hmw/article1.html>