**Requirements Specification**

Acronyms:

* Genetic Algorithm (GA)
* Neural Network (NN)

**Must Have Requirements**

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| **ID** | **Description** | **Scenario** | **Success Measure** |
| GA01 | The GA shall produce offspring from parents doing a crossover. | Show the child’s network produced from the parents. | It does the crossover successfully. |
| GA02 | The GA shall mutate offspring at random. | Show that mutation has occurred for a given offspring. | It does the mutates successfully. |
| GA03 | The GA shall hold 100 solutions for the population. | Show the 100 genomes from the file. | It does it successfully. |
| GA04 | The GA shall have a gene that shall keep the history of its evolution. | Show the file. | You see the evolution of the generations are changing and have a longer history the older the generation. |
| GA05 | The system shall write to a file of the genome’s genes and nodes every 5 generations. | Show the file that was written. | File was written successfully with no errors. |
| NN01 | The NN shall control the ship. | Run the program and see what happens to the ship. | The ship moves according to the outputs of the NN. |
| NN02 | The system shall save the network to a file every 5 generations. | Show the network from the file. | File was written successfully with no errors. |
| EX01 | The game shall give a fitness score for the individual solution. | Show the score for a solution. | It does it successfully. |
| EX02 | The system shall terminate when it doesn't do any better. | Show the what the average score over time. | You can see a clearly defined maximum in the graph. |
| EX03 | The system shall perform better than the average human. | Show the score and compare to the average score of a human. | The score is 700 or higher. 1000 being the max score. |

**Would Like to Have Requirements**

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| **ID** | **Description** | **Scenario** | **Success Measure** |
| EX03 | The GA will use threads to do mutation and crossover in the population. | Show that it found the best score in a shorter amount of time compared to the original | It does better than the original. |
| EX04 | The GA will be able to perform well against the next level. | Show the score it gets. | It is better than the average human. |
| EX05 | Try another implementation of a GA algorithm and test against its results. | Show the results from this algorithm. | If it performs better than the NEAT GA. |