

# Project Outline – Evolving Creatures

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## Description

The project is to create an evolutionary algorithm for a pre-existing framework. The pre-existing framework is a 2D car racing simulator where cars race over several instances. Each instance is a new population generated via an existing Evolutionary algorithm using the previous instance population. The framework being changed is the following ([https://github.com/red42/HTML5\\_Genetic\\_Cars](https://github.com/red42/HTML5_Genetic_Cars)).

I will be replacing the Genetic Algorithm in the framework which generates new populations of cars with my own Evolutionary Algorithm. The aim of this project is to optimise the creation of these cars so that they improve in a shorter number of instances. I will also be implementing a base Evolutionary algorithm to compare the performance of my-own algorithm to.

The methodology I will be following is the Waterfall model because of its simplicity to go back a step to make changes if something fails.

## Proposed tasks

**(07/02/19 – 21/02/19)** – The framework is written in JavaScript which I have little experience in, so I will be learning more about the language through the course of the project.

**(07/02/19 – 21/02/19)** – For the start of the project I will be going through the framework trying to find which parts of the framework are the genetic algorithm code and what parts of the framework interact with the Algorithm. This will allow me to know where I should be replacing and connecting code.

**(14/02/19 – 04/04/19)** – Testing and Design documentation, the design documentation will consist of what within the framework was changed and how the overall algorithm works and interacts with the framework. The testing will have the unit testing.

**(14/02/19 – 25/04/19)** – Project Final Report

**(14/02/19 – 21/02/19)** – Introducing a simple stripped-down evolutionary algorithm replacing the pre-existing algorithm. This will test the interaction points between the framework and the new Evolutionary algorithm, such as returning new population to the framework.

**(21/02/19 – 04/04/19)** – Additions to the evolutionary algorithm will be included such as Selection, Crossover and Mutation. These parts would be individually tested and tested together analysing the performance of the Cars, while making incremental changes to the algorithm to improve performance. This will be an ongoing process through the project.

**(21/02/19 – 07/03/19)** – A second Evolutionary algorithm alongside my own implementation which will be used as a comparison point.

**(07/03/19 – 04/04/19)** – The GUI/html side of the framework will be changed to include statistics from the evolutionary algorithms which can be used for comparison. This will be expanded on so that the user can view results over several instances. The framework would need further exploring to implement the changes to the GUI.

**(07/03/19 – 04/04/19)** – Researching Classifiers and Introducing a classifier in the selection process of choosing the parents, and possibly introduced in the crossover and mutation process.

### **Project Deliverables**

- The framework should successfully use an Evolutionary algorithm in combination with a classifier to create new populations of cars for every instance of the simulation.
- The implemented evolutionary algorithm should also optimise the cars performance over every instance run, getting better the more instances that are run.
- The GUI would show statistical results for all the run instances.
- The user would be able to compare the statistics of different instances past and present.
- The statistics would show the results from both Evolutionary algorithms, my own implementation and one for comparison.
- Testing documents would consist of unit tests to test the functionality.
- Design documents would give an overview of the algorithm and how it works.