School of Computing  
CA326 Year 3 Project Proposal Form

**SECTION A**

Project Title: Snake reinforcement learning agent with interactive user front-end

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*(A third team member is exceptional and requires detailed justification.)*

Staff Member Consulted for supervision Alessandra Mileo

Project Description (2 pages max)

**Introduction**

*Describe the general area / problem covered by the project.*

We are going to recreate the game snake, which is where the player maneuvers a line (the snake) which grows in length. The player attempts to eat items by running into them with the head of the snake. These items make the snake grow in length.

We want to create a program that can learn how to play the game to get better at the game. We want to test if a program can outperform a human player. To do this, we will use Q learning which is a reinforcement learning algorithm to create an agent that will learn how to play the game and find ways to optimize the maximum points it can get in a game.

The user will be able to change the rules of the game. This will allow the agent to retrain with the new set of rules and environment changes.

**Outline**

*Outline the proposed project.*

* Create the environment
  + We first need to create the game, environment and rules
* Create the agent
  + We will then create the agent
* Tests and train the agent
  + We will test the agent by training it with different rules
* Analyse the results
  + We will analyse the results and performance

**Background**

*Where did the ideas come from?*

Artificial Intelligence is a trending topic at the moment. There is a lot of research going into how to push the state-of-the-art in machine learning. We were both interested in machine learning and how it could be applied to things like gaming, optimization or technology for everyday use. We felt like going ahead with this project would be a very good introduction to the field of AI.

**Goals**

*What will the project aim to achieve?*

The aim of the project is to analyse the performance of the snake agent implemented in learning the game and adapting when the rules of the environment change.

*Why/when/where/how will it be useful?*

Training an agent to outperform human players can teach us how to optimize different processes in a variety of different subfields. It is also a good way for both of us to learn more about the field of AI and machine learning.

**Programming language(s) and tools**

*List the proposed language(s) you plan to use and any other software tools you might use (compiler, database, web server, etc.)*

Python language, Pygame, Numpy, Pyinstaller. Matplotlib

**Breakdown of work**

*Clearly identify who will undertake which parts of the project.*

*It must be clear from the explanation of this breakdown of work both that each student is responsible for separate, clearly-defined tasks, and that those responsibilities substantially cover all of the work required for the project.*

The breakdown of the workload is, making the game along with creating the environments and the rules, Creating the agent and training it, and then the user interface and graphics.

The specification requirements, class and product design and analysis will be done by the both of us.

Nicolas Oyeleye

I will be responsible for the game development. I will also be testing and training the agent after it is created.

Ionut Eusebiu Andrici

I will be responsible for implementing the UI interface and coding the agent. I will also train the agent under certain environmental rules.