



Project Proposal

Artificial Intelligence

[Group 8]

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- **Description of the topic/problem you want to solve**

After a long discussion we decided for our project we would like to use machine learning to make/train an agent that can play a game, then we started discussing what game. We decided to pick a game that is simple enough to start but hard to master, so we chose Snake a fully observable single player game. The goal in snake is to collect food without hitting walls or yourself, at the start it's simple but the snake extends with every time it eats, so you can easily trap yourself in a corner with no way to go. The final goal state in snake is taking up the whole field, this can be done easily by always going a certain path that covers the whole field, but this takes a lot of time. We want to implement an agent that can stay safe and still get the food. When writing this proposal, we had little to no understanding of machine learning, so we apologize for any wrong abstractions.

- **Goals that you want to achieve and how you want to check if you achieved them (e.g., trying the program on several test cases, if so which test cases)**

At first, we want to make a supervised learning agent. Next, we want it to collect enough food, so it takes up half of the screen. We can check this by giving it one point each time it eats food, when it has gotten a score equal to $(width * height - size) / 2$ we will know the agent takes up half of the field. After that the goal will be to win the game by covering the whole board and again just check the score. We will also check if our agent is faster than a static scripted agent that always wins. Final goal is to learn machine learning, we know we'll have achieved it if our agent always wins the game.

- **A work plan (idea how to tackle the problem, what do you need to do, in which order, how long do you think each part will take, who does what in the team)**

We are going to start by getting familiar with machine learning. Next one of us will make the snake game and a visualizer, while the other starts setting the libraries and environment. Then defining what constitutes a loss and a win and the score of the game. Finally, we will both start training the agent, this is the focus of the assignment. Making the game, setting up the libraries and defining score will take a short amount of time since the focus is to get to know machine learning and to train the agent to play the game perfectly. We estimate each of us will spend 30 hours each to finish the project, so 15 hours for the training and 15 for the rest.

	Learn Machine learning	Snake game	Set up Libraries	Define score	Train model
Hallgrímur	X	X		X	X
Egill	X		X		X

- **References to material that you think of using (literature, software libraries, ...)**
We plan on using python as our programming language since we're both familiar with it and it has multiple machine learning libraries that we can use to our advantage. We have thought about using TensorFlow and Q-learning, but will use the one we find best suiting for the problem. We're going to use the material from the book *Artificial intelligence: a modern approach* and the lectures by Stephan Schiffel to get an understanding of machine learning.