

Initial project plan - feb. 17

- We will make a generic way to train an artificially intelligent (AI) player for computer games. The training will use a genetic algorithm, where the gene is a neural network.
- How does the AI player work?
 - The AI player consists of a neural network that takes as input things the AI player can observe (e.g. distance to a wall or enemy, the enemy's speed, the direction the player is currently facing), and outputs an action (e.g. move right, jump).
- How do we train an AI player for a specific game using a genetic algorithm approach?
 - Maintain a population of different AI players. These AI players differ in their genes. The genes are actually just weights between neurons in a neural network.
 - For each population, we measure how good every AI player is at playing the game.
 - A set of the best AI players are selected for the next population, where new AI players are added to the population by crossing and mutating genes of the selected AI players.
- How does the generic interface work?
 - The user must give a fitness / utility function, which the genetic algorithm will use to determine how well an algorithm is performing.
 - The user must specify which observations the AI player can see and which actions it can output
- When making a generic trainer, we will look at what gene mutation and crossover methods work best for three different games
 - mutation probability, one-point crossover, two-point crossover, uniform crossover, three parent crossover, combined mutation and crossover or separate?
- How do we choose three different games - what makes games different seen from an AI perspective?
 - Single player or multiplayer games
 - Games where the fitness function is easy to define / hard to define
 - **QUESTION TO RADU:** Should we focus only on single player games with an easily defined fitness function, or should we focus on making a solution that works for all combinations, or will that be too broad?

Until next meeting

- Find articles on genetic algorithms and, if needed, general papers on computational intelligence
- Try implementing simple software based on above research

Proposed phases of project

1. Beginning / initial development
 - a. Develop games for use
 - b. Develop generic learning interface for game creators to use
 - c. Develop genetic learning software that uses the learning interface
 - d. Implement generic learning interface in the developed games
2. Experimental / testing phase
 - a. Experiment with crossover methods
 - b. Different games
3. Article writing
4. Conference searching
5. Article refinement
 - a. Continuous
6. Deadline