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**Evolutionary Algorithms – (Progress Report I)**

**Methodology**

Tic Tac Toe is a game that dates back decades. It meets all the properties and conditions needed for out research paper. It has a simple set of rules, the player can easily interact with it, and it is repeated over a certain number of rounds. The integrated AI can be very simple due to the simplicity and nature of our game.

A simple Tic-Tac-Toe game will be coded in python using a few different libraries.

Libraries in use are:

* Random
* Collections

Alongside those libraries, the Q-Learning algorithm will be implemented. The Q- Learning algorithm is a simple model free reinforcement learning type algorithm. This means that the implemented AI will be self-learning from the Player’s actions. This type of algorithm is based on a reward and punishment system. It learns the value of a certain action from a set of test runs, and based on those results, it self-adapts to choose the best action in a certain situation.

**Q-Learning Algorithm**

Using a simple Q-Learning algorithm for such a simple game like Tic Tac Toe, we can easily derive research results basing them on how the AI learns, self-improves and on actual game results vs the player.

**Expected Results**

Due to the nature of the game and its simple rules, the Q-Learning algorithm will be able to advance the AI to a point where it is almost impossible to win. The AI will at most TIE with the player if not win. In a rare case where the AI loses in a certain round, it will self-improve and continue it’s winning streak in the next round.