Homework #4
Reinforcement Learning for Game Playing

In this homework you should implement a reinforcement learning based agent (RL-Agent), for solving the game of tic-tac-toe. On the other part of the game there is another agent that you should implement it by any useful algorithm you know for solving tic-tac-toe (Logic-Agent). These agents (RL and Logic-Agents) compete with each other lots of episodes.

Program

- After training phase, your program should have the feature for saving the RL-Agent for future use, and loading it for continuing the training or playing (testing phase) with user or Logic-Agent
- Testing phase (playing with user or Logic-Agent) should be shown visually, here is one example:

![Figure 1](image.png)

*Figure 1*. One example of a specific state in the game

- The program asks from the user, whether the RL-Agent should start the game first or second
- As long as you can, take all parameters from input, such as policy (e.g. $\epsilon$-greedy), discounting factor, number of training episodes and etc
- Set the best parameters as your default values in the program
- Any extra features for the program are warmly accepted

Documentation

- You should explain the Logic-Agent and RL-Agent algorithms, and how you trained RL-Agent
- Discuss why you chose those specific parameters for training
- Propose an idea for measuring the performance of the agents, and the relation of performance with other parameters
- Any creativity is welcomed, such as testing the RL-Agent on other different Logic-Agents, and measuring its performance on different situations. Or you can design lots of questions by yourself and answer them by experiment or theory

Remember, this time documentation counts more than before.

Extra Scores for

- Writing your document in article format (abstract, keywords, introduction, main context, experiments, conclusion and references), you can even copy the paper formats of the Springer or IEEE
- Using text editors such as FarsiTeX or TeX (in this case you should submit both .ftx or .tex files in addition to .pdf format)