Computational Intelligence in Games Summer 2017

Prof. Dr. Sanaz Mostaghim, Alexander Dockhorn

6. Exercise Sheet

Please hand in your programming assignment by sending your documented source-code, neccessary files for execution and a short explanation in written form to alexander.dockhorn@ovgu.de. In case you are working in a group list all the group members and a respective contact e-mail-adress in your e-mail.

Assignment 32 Game Theory

Roger and Colleen play a game. Each one has a coin. They will both show a side of their coin simultaneously. If both show heads, no money will be exchanged. If Roger shows heads and Colleen shows tails then Colleen will give Roger 1 Dollar. If Roger shows tails and Colleen shows heads, then Roger will pay Colleen 1 Dollar. If both show tails, then they both get 2 Dollar from the bank.

a) Write the pay-off matrix (for both player). Note: You can write the result in one matrix or in two matrices.

b) What is the Nash-equilibrium for this pay-off matrix? Please explain.

Assignment 33 Transition Graph

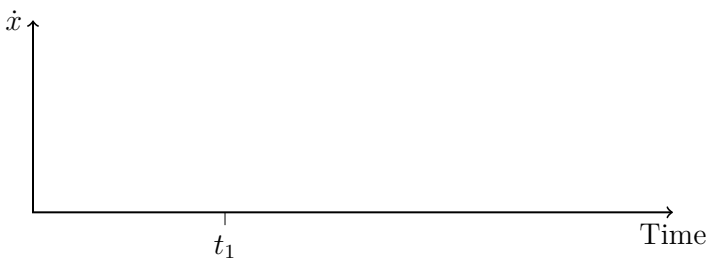
a) Given the game of Assignment 32. How can we code the current state of the game in case we continuously play it and each person and the bank has a fixed amount of money at the start.

b) Draw the transition graph for one round of the game in case both players have the same amount of money.

Assignment 34 Evolutionary Game Theory

a) What is the goal of replicator equations?

b) Assume a growing population. At time point t_1 this population is infected by a deadly virus. However, 10% of the population are immune and survive the following outbreak. Draw the respective replicator equation.



Computational Intelligence in Games Summer 2017

Prof. Dr. Sanaz Mostaghim, Alexander Dockhorn

Assignment 35 Reinforcement Learning

a) What is the Discounted Return? Write the corresponding equation.

b) Name two different Reinforcement Learning algorithms and describe their differences in context of analysing the game tree. Note: e.g. Exhaustive Search explores the whole game tree to determine the best possible option in each move.

Assignment 36 Monte Carlo Tree Search (MCTS)

a) Name and describe the basic components of MCTS.

b) In MCTS we differentiate between Exploration and Exploitation. Describe the differences of both concepts. How is the search procedure balanced between those two concepts.

Assignment 37 Evolutionary Algorithms

a) Name the basic components of an Evolutionary Algorithms.

b) Describe two Crossover methods and provide an example for each method.

c) Jenkins Nightmare describes the total disappearance of any diversity in a population. Show that Crossover is not sufficient for completly avoiding Jenkins Nightmare.

Assignment 38 Multi-Objective Learning

- Explain the concept of Pareto-Optimality.
- Given the points in the following diagrams. Mark all Pareto-Optimal solutions in case you want to minimize/maximize both attributes.