

SchoolNova Computer Science 201

Homework 1-16-22

Save your code as `lastname_homework.py` and submit on Google Classroom

For this homework, try to avoid for loops as much as possible. Instead, try to use numpy arrays and functions. Using numpy create the following simulation model:

- 100 AI players participate a Rock-Paper-Scissors tournament.
- The tournament consists of 20 rounds.
- Each player plays exactly 1 game in each round.
- The players are paired randomly (hint: you may want to use `np.random.shuffle` here).
- Each player has a very simple strategy: play either Rock or Paper or Scissors.
- Assume that initially all players have 60% likelihood to play Rock, 30% to play Paper, and 10% to play Scissors (hint: use `np.random.multinomial` here; see your class notes).
- Winning gives you 3 points, ties are 2 points, and losses are 1 point.
- Use numpy array (POP) to store information about the players' strategies (for example, you can code Rock as 0, Paper as 1, and Scissors as 2).
- Do not forget to create a column with a unique numerical ID for each player.
- A column in the array could be used to store payoffs (points). The points accumulate.
- Another column in the array could be used to store the opponent ID.
- Create another numpy array to store data (DATA): the number of players choosing each strategy each time period (what should be the shape of such array?)
- Assume that if a player loses, there is 20% chance they change their strategy and imitate the strategy that defeated them (Rock becomes Paper, Paper-Scissors, Scissors-Rock).
- Assume that if the game ends in a tie, the players adopt a random strategy next time.
- Each round save the number of players playing each strategy (in DATA).
- Plot the DATA array (you can utilize the plotting functions that we used in previous projects; of course, you would need to modify them accordingly).