

Game Theory

Assignment II

Deadline: 13.03.2022 23:59 PM

Outputs: A PDF-report in IEEE format called *NameSurnameReport.pdf* (for example, *IvanIvanovReport.pdf*), SINGLE Java file with your code called *NameSurnameCode.java* (for example, *IvanIvanovCode.java*) and your SINGLE source code file used for your testing and testing cases called *NameSurnameTesting.java* (for example, *IvanIvanovTesting.java*)

Grading Criteria: working code (7 pt), code quality (3 pt), rank in tournament (5 pt), report (10 pt)

Requirements:

- Program must compile under JDK8, use of lower or higher JDK will automatically lead to 0 even for correctly written codes
- Code should follow Java Code Conventions (see <https://www.oracle.com/technetwork/java/codeconventions-150003.pdf>), it should be readable and should contain JavaDoc
- Report should contain title, student's name, surname, group, description of your method, etc.
- Do not use additional libraries and frameworks (e.g. Spring, Lombok, etc.)
- NO extension of a deadline. Works sent after deadline will NOT be evaluated
- NO plagiarism. Plagiarized works will not be evaluated. MOSS will be used for plagiarism detection

Problem Statement:

Moose are large quadrupedal herbivores which range in Northern longitudes from the Northern United States, Canada, Scandinavia, and Russia. They are territorial in nature and they are known for fighting when encountering each other. In this simulation, we will create a model of the environment in order to understand the nature of these creatures.

Problem Definition:

The environment in which they live is three territorial regions which we will helpfully entitle as *A*, *B*, and *C* fields. In these fields, various vegetation grows in a sigmoid fashion given by equation

$$f(X) = \frac{10 * e^x}{1 + e^x}$$

You may assume that these fields start with $X=1$, i.e. $f(1)$. If a Moose is not present in the square, then the field increases X by 1. If a Moose is in the field, or if two Moose are in the field, then the field's X is decreased by 1, to a minimum of 0.

Moose receive the following payouts. If there is only a single Moose in the field k , then he eats the vegetation based on the amount available and gains $f_k(X_k) - f(0)$. If both of the Moose are in the same field, then they will fight. Fighting is exhausting and prevents eating and damages the local area, and causes a score of 0 to be given to both Moose.

Task:

You will create an agent for the Moose, and test your Moose agent against others. Your code should be written in *Java*, and you need to create your agent (public class with public constructor, if applicable) implementing the interface as seen below. The interface has:

1. a void method *reset()* which will be called in order to 'reset' the agent before the match with another player containing several rounds
2. an integer method *move()* returning the move which is given the last opponent move (0 – if this is the first move), and the current *X* values for the three fields. The *move()* method returns 1 for *A*, 2 for *B* and 3 for *C* fields
3. *getEmail()* method returning *String* with your Innopolis email.

You will have to test your agent(s) via a tournament method. Then report on your findings. Finally, you will present a "best agent" which will be part of the class competition.

Submission:

1. Any Source Code used for your testing and testing cases
2. Your player code
3. A PDF-report of 2 pages in IEEE format which gives a description of your method and talks about the design process and testing used in order to make your player agent. You can find the format files at: (<https://www.ieee.org/conferences/publishing/templates.html>).

You are provided with an interface code, which you need to implement by your player

```
package gametheory.assignment2;  
  
public interface Player {  
  
    void reset();  
  
    int move(int opponentLastMove, int xA, int xB, int xC);  
  
    String getEmail();  
}
```

The code of this interface should be excluded from your submission because all of your player codes will be located in the same directory. The multiple versions of the Player interface will lead to compilation error. Moreover, you are NOT allowed to make any changes in the given code, the package also should remain the same. You should assume that your code should be in the package called *gametheory.assignment2.students2022*. Please, ensure that you follow all of the given instructions because it can significantly affect your grade.

Note: You are expected to create your own code, and write your own report upon your agent. You are, however, free to discuss your agent with classmates, plan agents with work together in the tournament, etc. Use any VCS or cloud for storing your code. Broken computer should not be the reason for loosing your code. To avoid 0 for plagiarism do NOT use public VCS repositories, only private ones