DS2 Problem Solving 2024 : Process Challenge Game

2^{nd} BIS

***Be Confident, Be Strong, Be Creative and Clever for a* BETTER Future.**

Best of Luck Great Dear Students

1 Problem Statement: Process Challenge Game

Two players are engaged in a competitive and immersive game known as the "Process Challenge Game." This game consists of three stages, each presenting unique problem-solving challenges and requiring strategic thinking and decision-making from the players.

1.1 Game Overview

- **Players:** Two individuals competing against each other.
- **Objective:** To earn the maximum number of points by successfully completing the missions in each stage.
- **Approaches:** Players must strategically choose from a set of problem-solving techniques for each stage, aiming to optimize their performance and outmaneuver their opponent.

1.2 Stage Descriptions

1. **Stage 1 (Strategic Thinking):** In this stage, players are challenged to color a game board represented as a matrix divided into equivalent zones. The board's size, the maximum number of colors, the size of each zone, and the number of initially colored squares are introduced at the start. Players must strategically select the colors to fill the board, aiming to minimize the number of colors used and finish the task in the shortest time possible. However, there are additional playing conditions:

   - Each color cannot be used more than once in a row or in a column.
   - Adjacent squares cannot have the same color.

   Points are earned based on the time taken to solve the game.

2. **Stage 2 (Forest Navigation):** Players navigate a forest containing a starting point and a set of paths, each leading to the same endpoint. Each path has a length, a difficulty coefficient, and obstacles to confront. The objective is to reach the endpoint first while overcoming obstacles along the way. Points are earned based on the number of obstacles faced and the time taken to reach the endpoint.

3. **Stage 3 (Zombie Confrontation):** Players confront zombies, each guarding a treasure with a different value. Each zombie also possesses a combat power. Players must strategically choose which zombie to confront to maximize their profit. The game ends either by time running out or by eliminating all the zombies. Points are earned based on the total value of treasures collected, calibrated by the number of points from the previous stages.

1.3 Gameplay

- Players strategically select problem-solving techniques for each stage, aiming to optimize their performance and outmaneuver their opponent.
- For each stage, a set of approaches and techniques are displayed, and the choice of technique is made by the "master" of the process via keyboard or mouse click.
- The gameplay is ensured by two processes (threads) in a challenge, and a simulation is displayed for each stage to provide insights into the effectiveness of chosen approaches and techniques.

2 Technical Stack :

- A python code editor,
- python 3.12+
- Nothing prevents you from using another language like java, typescript, Javascript or C#.

3 Required Work :

1. ***Initialize the problem by introducing data or generating them randomly***
2. ***solve problems using techniques and approaches like backtracking, branch and bound, and dynamic programming techniques.***
3. ***The use of other strategies is not prohibited.***

4 Optional Work :

1. Implement a graphical user interface.
2. Implement each part of the project using more than one strategy.

5 Note :

The optional work will be graded as a bonus (extra points in the DS1 and in the CC grade).

- The project is to be carried out by a group of 4 or 5 students.
- You must send via email to homework.isg@gmail.com

1. a ***report (doc file)***,
2. a ***presentation (ppt file)***,
3. the implemented ***source code***, and
4. some ***screenshot*** showing the tests performed or a demo (video).

- A presentation is scheduled during the week of **May 2, 2024** during class or tutorial sessions.
- The deadline to send the work by email is **May 2, 2024 23:59**.
- **No extra time will be granted**.