LAIG 2020/2021 - TP3 report

Group T03-G05

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Necessary actions to have the complete program running

- Start an HTTP server in the directory that contains the **lib** and **TP3** directories, e.g.: `python -m http.server 8080`.
- Start a sicstus prolog instance and consult the file `server.pl` inside the **prolog** directory (inside the **TP3** directory).
- Call the `server.` predicate inside the sicstus prolog instance.

The steps above would result in the HTTP server open in 0.0.0.0:8080 and the prolog server open in 0.0.0.0:8081. The game can be accessed in a browser supporting WebGL at the address **http://0.0.0.0:8080/TP3/**.

Short summary of the game main rules

Emulsion is a board game for two players.
The game board is a square is divided in black and white squares (pieces) of equal size. The board can have any size the user wants. At the beginning of the game, the pieces are organized in a checkered pattern.

Game terms:

- The **value** of a piece is the number of pieces of the same color orthogonally adjacent to it, plus half the number of adjacent board sides.

- The **group** of a game piece is the set of all the pieces we can reach from that piece with orthogonal movements only.

- The **value of a group** is the number of pieces in a given group.

- A given player's **score** is the size of his largest group.

Black always plays first. At the end of each player's turn, it's the other player's turn.
During his turn, a player can switch two pieces places (**one move**). These pieces need to have **different colors** and be **orthogonally or diagonally adjacent**. Furthermore, a move is only valid if the piece with the player's color in the pair increases in **value** in its new position.

The game ends when a player has no more available moves on his turn. The winner is the player with the **highest score**.
In case the players are **tied**, the values of their second largest, third largest, and so on, groups is added to their score until the time is resolved.
In case the players are still **tied**, the winner is the player that last made a move.

Source.

For the purposes of our implementation of the game, a players that runs out of time during his turn loses the game.

User instructions

Setup and Start New Game

Before starting a new game, the user can change the game options that will affect the gameplay. Here is a list of the setup:

- Difficulty - Easy / Medium / Hard
- Game Mode - PvP / PvAI / AIvP / AIvAI
- Board Size (default 10)

Both the difficulty and the game mode can be changed by pressing the buttons on the scoreboard. The board size is a number input on the interface.

Once everything is set up, pressing the New Game button will start the game. Pressing the New Game button again will start a new game with any options you changed.

Theme

The game can be played in two different themes (scenes) that we have created. The user is able to switch between these, at any point in the game, in the dropdown in the interface's Game directory.

Lights

In the Lights interface directory, there are some light toggles. There is one toggle for each light in the current scene. By pressing the toggles, the user will turn off/on a light.

Cameras

Below the Lights interface directory, there is a dropdown to select a camera. On the top, the resetCamera button resets the current camera's position to its default position.

Extras

The Debug interface directory has two options. The first one can be used to show/hide normals of the objects in the scene. The other toggle shows/hides the scenes' lights.

Game Move

To make a move, the player has to choose two pieces. The pieces which have valid moves are marked with a green border (highlight) around them. The current selected piece is marked with a red-ish border (highlight) around it. When a piece is selected, the valid moves for that piece are highlighted.

Undo Move

To undo the last game move, the user can press the undo button. This can be repeated until there are no more moves to undo (reached the game board's starting state).

Scoreboard

On the scoreboard, there is information about the current score of the players, the remaining turn time and the results of the previous games.
The score is show has: `B:<black score> - W:<white score>`. For example, `B:4 - W:7`. This means that the black player has 4 points and the white player has 7 points. This information goes along with some text below for better understanding.
Next to the scores there is a timer counting down the current player's remaining turn time. When the timer reaches 0 (because no move was made) the other player wins. Once a game ends it is added to the history. The history shows the scores of the last 3 games.

Game Movie

To play the game's movie, the user can press the Start Replay button. Once the button is pressed, the movie will start and the button can be pressed again to stop the replay, and go back to the game state before the replay was started.
As long as at least one game has started, this button can be pressed at any time.