WEC 2019 Competition

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Catch Basins

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OVERVIEW

Our intent is to create a game similar in style to Minesweeper capable of simulating random distributions of catch basins. It will then allow a user to attempt locating all the empty spaces on the grid without accidentally hitting a catch basin.

Finally, the game will be played by a bot capable of solving the game.

GOALS

- Level 1: Backend
- Level 2: Create a User Interface
- Level 3A: Accept User Input (Game Play)
- Level 3B: Accept User Input (Customizable)
- Level 4: Play the Game

SPECIFICATIONS

Technologies

- Tornado web server
    - We chose Tornado because it is modern, scales well, and has good support for websockets
- JavaScript client using Pixi.js
    - We chose Pixi.js because it is fast at rendering 2D graphics
- JSON protocol over websockets
    - We chose the websocket protocol because it is well suited to persistent connections

- We choose to use web technologies so that the game could be cross-platform and even mobile-friendly

Client (client -> server)

- JOIN
    - Requests to join the game.
    - Params: { size: number, seed: number }
    - Returns: { success: boolean }
- BOARD
    - Requests a copy of the board.
    - Params: N/A
    - Returns: { success: boolean, board: [[]] }
    - board is a multidimensional array indexed [x][y].
    - Each element of board is a JSON object:
    - {visited: true/false, basin: true/false, adjacent: <number>}
- MOVE
    - Makes a move.
    - Params: { x: number, y: number }
    - Returns: { success: boolean }

Server (server -> client)

- DONE
    - Used to return data after an operation has completed.
    - See the “Returns” section for each client request.

Division of Work

- Backend (Python tornado server and game logic)
    - Kyle
    - Nayan
- Frontend (Javascript client and graphical interface)
    - Mitch
    - Ryan
- Bot
    - Nayan

MILESTONES

Create the web server and basic game logic

Create the user interface using web technologies

Establish communications between the client and the server

Develop Bot

Data Structures

- Wrapper Objects
    - We used wrappers over the Pixi rectangle object to allow us to add metadata such as which nodes had been accessed, basins, etc
- Arrays
    - Used 2-D arrays to keep track of the board