Assignment 2 Software Design Document

CS2300 Section 3 Spring 2023

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Project Description

This program creates a game board for two people to play on. Accepting points from a file, it would create a line on the grid and, depending on the player, would place X's or O's on the tiles that the line passed. The turn would not be valid if the points given had previously been used or if the current line was perpendicular to another line on the board. At the end of the game, the X's and O's on the board are totaled, and whichever player has more of the board covered is the winner.

Approach

I created the board, and then given the points from the file, I validated the turn. If the turn was valid, I would then process the play. Using these two points, I would create the line using the parametric equation of a line. Then, using the parametric equation, I would find the distance between the line and every cell in the grid. If the distance between the point (middle of the cell) and the line were between 0 and 0.5, then the line is in the cell and therefore will be flipped to either an X or an O, depending on the player.

Detailed Design

Programming Language

I used Java for this assignment, as it is the language I am most comfortable with.

Modules

First is the createMatrix module. The grid size is inputted into this module, and outputted is a 2D array with the inputted value as the dimensions.

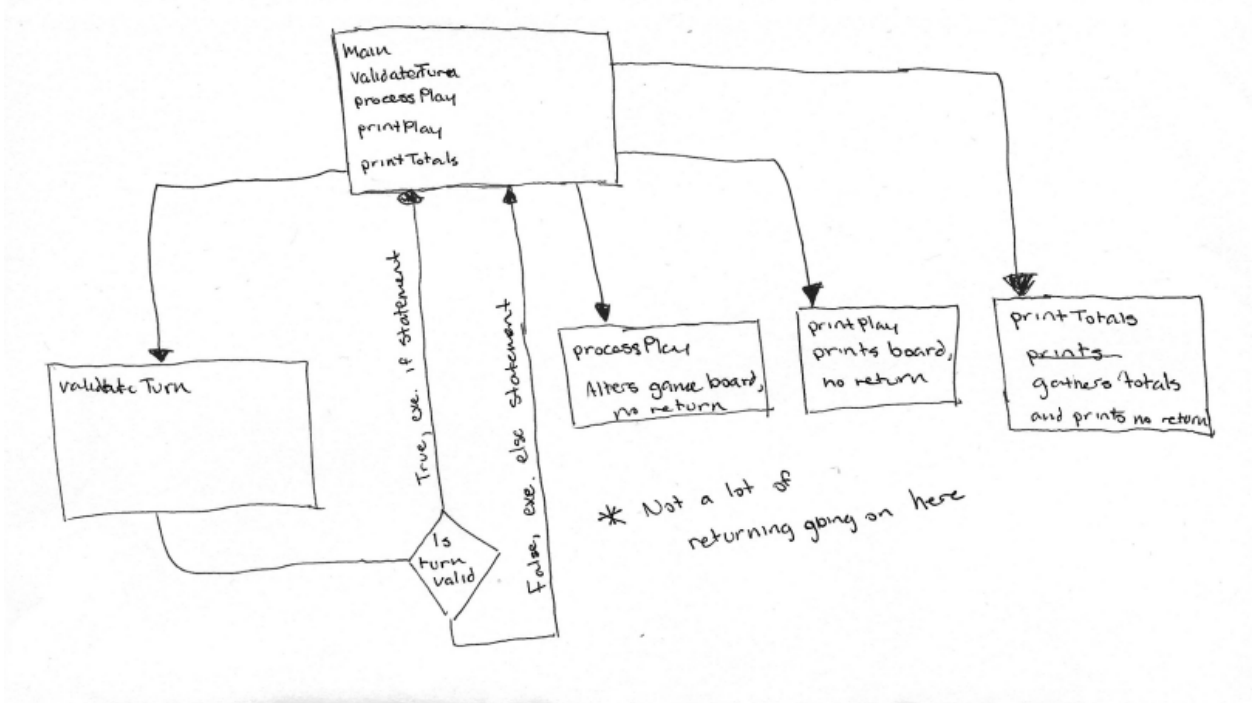
ValidateTurn module. The inputs for this module are the current points being played, the list of previous plays, the list of points that can't be played, and the invalid turn counter. This method tested the current points against the previously played coordinates and, if applicable, the list of points that can't be played, to validate the turn. Would also test if the line being played was perpendicular to any line on the board already. Would return true or false depending on the tests.

processPlay module. Inputs are the game board, the current points, and the current player. It would process the play, using the parametric equation for a line, and the equation of distance between point and line using the parametric equation. The board will be iterated through and the distance between the line and the midpoint of the iterated cell will be determined. If this distance is less than or equal to .5, the cell will change to an X or O depending on player. This is a void method, so it returns nothing, but it alters the game board itself.

printPlay module. Input is only the game board. All this method does is print the game board. This method is called after every turn. Output is to console, or file.

printTotals module. Input is only the game board. This method iterates through the board and for every X and O it finds, it increments the respective player's score by 1. Whichever player has the most X's or O's on the board wins.

Flowcharts



Not a very good flowchart but shows the basic flow between the modules.

Key Data Structures

2D arrays for creating the board. ArrayLists for being able to keep an array with a dynamic length to store previous plays.

Test Description

I had two test files of my own, plus the three given. They all seemed to work, I didn't really check into detail if they were properly working or not, but from looking at what was printed, it looks like it works. My main concern was getting compiler errors.