Inf1B - Assginment 1

s2101367 Sean Choi

Overview

The Conectfour programme takes the MVC design pattern. MVC design pattern is an abbreviation of Controller, Model, and TextView. They are created and implemented complementarily. In this design pattern, the controller is like a commander or a brain of the program. It has a model and view as a field, and it controls and implements the overall connectFour game components to run. The overall game is controlled by the Controller class by taking Model and TextView class. Model class mainly has the board and its size, and functions to check input validation and to put a stone to the possible slot. TextView is largely employed to display a board to a user on a computer screen and output a necessary message.

Basic Features

Controller class controls overall gameplay by taking Model and TextView class as a field. The class calls the TextView class to display the board, which is taken by Model class. Also, two players are setting by the values of boolean, which is true or false, each player's turn change after when the first turn player is set and put a stone to the available slot.

Model class is mainly representing the state of a board such as the size of the board, and methods to implement the programme. The board is represented with the two-dimension array. This two-dimension array is associated with the features of this game that there are two players and two stone. Furthermore, in terms of input validation, isMoveValid function is used for checking column and row input validation. If the column input is a negative integer or greater or equal to the number of columns, it returns false. Also, isMoveValid function check if there is any empty row on the column. Subsequently, after checking the input validation, the stone is placed on the available slot by using the makeMove function.

TextView class in most part visualise something important to user to play the game. For example, this class displays the board with the stone each player selects. Furthermore, it shows a message to the user so that users can respond to the message by putting an available value.

Intermediate Features

Allow the user to start a new game

In order to start a new game, the before game needs to be replaced and then a new game can start in the same way like before. If a user decides to play the game when they receive the re-start request message, the program resets the board by calling restartSession method, and then implement the same loop like setting player, checking the validation, and putting a stone. Since most of code of startSession method is similar to starting a new game, I created restartSession by adding a reset method to restart a new game.

Variable game settings

Variable game settings need to take user's inputs to employ setting the size of the board and setting winning condition. In order to do that, three methods in TextView class is used to employ user's input as a variable value. Three getAskForRow, get AskForCol, and getAskForCheckWinVariable methods take a user's input as a variable value to set the size of the board and winning condition. Also, in order to increase conciseness and security of code, a new method are used such as ValidRowInput, ValidColInput, and ValidWinInput.

Enhanced input validation

When you play the game, the program can be crushed if the input is not valid. To resolve these issues, the program is modified to ask users to put the available input when they put an unavailable one. There are three crushing input, firstly if the choose column input is a negative or greater or equal to the number of columns, it is crashed. In addition, when users are setting the input of the size of the board, the number of row and column greater than or equal to 0 can cause crush the program. Also, if the winning variable is less than or equal to 0 or greater than the minimum value between the number of row and column, it becomes crushed. For the issue to be solved, using while loop helps users to put an available input until they do.

Automatic win detection

Automatic win detection function is a function to detect a winner of the game and to declare the winner player. In my program, checkWin function is an automatic win detection function, and this function checks, for the given stone, the length of each direction line that is formed with the same stone at the same direction line. For example, getHorizontalLength method checks a horizontal line if it is contiguous starting from a row.

Advanced Features

Play against the computer

In this implementation of an NPC, two versions of AI are made. First is getNaiveMove method, which has a simple rule by which the computer makes arbitrary but valid moves. The next method is more improved than getNaiveMove. The improved getSmarterMove makes the computer a winning move by evaluating the length of a valid column. If the valid column selected by computer has the longest length of a continuously placed stone, the computer selects the column. In other words, the longest length of a successive stone may refer to the high possible move of a winning. However, these AI functions have limitations. Since a computer can not prevent the human opponent from winning on their next turn by avoiding making moves, an intellectual human can always win.

Research a design pattern

MVC design pattern is the abbreviation of Model, View and Controller design pattern. Three structures including Model, View, and Controller have their separation roles and they are employed complementarily. Controller, which is similar to the brain or commander of the program, acts on both model and view. Controller sends data into model and updates data changes on the view. For example, in the main method, controller.setStudentName(“John”); means the string parameter, “John”, is used as a parameter of setStudentName function in StudentController class. Then, this function order setName(name) function in Model class to take “John” as a parameter. Since Controller acts on a model, setName method in Model class can be called. Subsequently, “John” is declared in the variable name. Thus, the controller updates model data from Robert to John. Furthermore, Model is an object and updates controller when the data changes. In the same example of setStudentName function, for instance, when String John is used as a parameter of setStudentName function, model updates controller with the changed data with the parameter “John”. Subsequently, in controller.undateView, View visualised the changed data that the model contains.

As illustrated above, MVC design pattern is consist of three parts, and each association’ concerns are separated. Since the pattern is separated, multiple developers can collaborate and work together, which means that application development becomes fast. Furthermore, applications can be easily updated so that this is appropriate for the application relevant to a business model.

Evaluation

From this assignment, I have learned that the features of object-oriented programming and MVC design patterns. The object-oriented programming language, especially in Java with MVC design patterns, helps for code maintenance, reusability, and security. Theses benefits eventually lead to better productivity for the Connect Four problem-solving. Additionally, with the adds of MVC patterns, code maintenance and modifications are improved more effectively.