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/**
 * Game of Life.
 * Usage: "java GameOfLife fileName"
 * The file represents the initial board.
 * The file format is described in the homework document.
 */

public class GameOfLife {

    public static void main(String[] args) {
        String fileName = args[0];

        //// Uncomment the test that you want to execute, and re-compile.

        //// (Run one test at a time).

        //test1(fileName);

        //// test2(fileName);

        test3(fileName, 3);

        //play(fileName);
    }

    // Reads the data file and prints the initial board.
    private static void test1(String fileName) {
        int[][] board = read(fileName);
        print(board);
    }

    // Reads the data file, and runs a test that checks
    // the count and cellValue functions.
    private static void test2(String fileName) {
        int[][] board = read(fileName);

        //// Write here code that tests that the count and cellValue functions
        //// are working properly, and returning the correct values.
    }

    // Reads the data file, plays the game for Ngen generations,
    // and prints the board at the beginning of each generation.
    private static void test3(String fileName, int Ngen) {
        int[][] board = read(fileName);
    }
}

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    for (int gen = 0; gen < Ngen; gen++) {

        print(board);
        //show(board);

        board = evolve(board);
    }
}

// Reads the data file and plays the game, for ever.
public static void play(String fileName) {
    int[][] board = read(fileName);
    while (true) {
        show(board);
        board = evolve(board);
    }
}

// Reads the initial board configuration from the file whose name is fileName,
// uses the data
// to construct and populate a 2D array that represents the game board, and
// returns this array.
// Live and dead cells are represented by 1 and 0, respectively. The constructed
// board has 2 extra
// rows and 2 extra columns, containing zeros. These are the top and the bottom
// row, and the leftmost
// and the rightmost columns. Thus the actual board is surrounded by a "frame"
// of zeros. You can think
// of this frame as representing the infinite number of dead cells that exist in
// every direction.
// This function assumes that the input file contains valid data, and does no
// input testing.
public static int[][] read(String fileName) {
    In in = new In(fileName); // Constructs an In object for reading the input file
    int rows = Integer.parseInt(in.readLine());
    int cols = Integer.parseInt(in.readLine());

    int[][] board = new int[rows + 2][cols + 2];

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    for (int i = 1; i <= rows; i++) {
        String line = in.readLine();
        for (int j = 1; j <= Math.min(line.length(), cols); j++) {
            if (line.charAt(j - 1) == 'x') {
                board[i][j] = 1;
            } else if (line.charAt(j - 1) == '.') {
                board[i][j] = 0;
            }
        }
    }
}

return board;
}

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// Creates a new board from the given board, using the rules of the game.
// Uses the cellValue(board,i,j) function to compute the value of each
// cell in the new board. Returns the new board.

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public static int[][] evolve(int[][] board) {
    int[][] newBoard = new int[board.length][board[0].length];
    for(int row = 1; row < board.length - 1; row++){
        for(int col = 1; col < board[row].length - 1; col++) {
            newBoard[row][col] = cellValue(board, row, col);
        }
    }
    for(int row = 0; row < board.length; row++){
        for(int col=0; col<board[0].length; col++){
            board[row][col]= newBoard[row][col];
        }
    }

    return board;
}

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// Returns the value that cell (i,j) should have in the next generation.
// If the cell is alive (equals 1) and has fewer than two live neighbors, it
// dies (becomes 0).

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// If the cell is alive and has two or three live neighbors, it remains alive.
// If the cell is alive and has more than three live neighbors, it dies.
// If the cell is dead and has three live neighbors, it becomes alive.
// Otherwise the cell does not change.
// Assumes that i is at least 1 and at most the number of rows in the board - 1.
// Assumes that j is at least 1 and at most the number of columns in the board -
// 1.
// Uses the count(board,i,j) function to count the number of alive neighbors.
public static int cellValue(int[][] board, int i, int j) {
    /// Replace the following statement with your code
    //System.out.println("row is: " + i);
    //System.out.println("col is: " + j);

    int amountOfLiveNeighbors = count(board, i, j);
    //System.out.println("amount of live neighbors is: " + amountOfLiveNeighbors);

    boolean isCellAlive = board[i][j] == 1;
    //System.out.println("isCellAlive: " + isCellAlive);
    if(amountOfLiveNeighbors == 3 && !isCellAlive){
        return 1;
    } else if ((amountOfLiveNeighbors == 2 || amountOfLiveNeighbors == 3) && isCellAlive){
        return 1;
    } else if(isCellAlive && amountOfLiveNeighbors < 2) {
        return 0;
    } else if(isCellAlive && amountOfLiveNeighbors > 3) {
        return 0;
    } else {
        return board[i][j];
    }
}

// Counts and returns the number of living neighbors of the given cell
// (The cell itself is not counted).
// Assumes that i is at least 1 and at most the number of rows in the board - 1.
// Assumes that j is at least 1 and at most the number of columns in the board -
// 1.
public static int count(int[][] board, int i, int j) {

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//// Replace the following statement with your code.

int cellCount = 0;
for(int row= (-1); row<= 1; row++){
    for(int col = (- 1); col <= 1; col++){
        if(row != 0 ||col != 0){
            if(board[i+row][j+col] == 1){
                //System.out.println("ROW r: " + row + "COL rajel " + col);
                cellCount++;
            }
        }
    }
}

return cellCount;
}

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// Prints the board. Alive and dead cells are printed as 1 and 0, respectively.

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public static void print(int[][] arr) {
    //// Write your code here.

    for( int i = 1; i < arr.length-1 ; i ++){
        for(int j = 1; j < arr[i].length-1; j++){
            System.out.printf("%3d", arr[i][j]);
        }
        System.out.println();
    }
}

```

*// Displays the board. Living and dead cells are represented by black and white
// squares, respectively.*

*// We use a fixed-size canvas of 900 pixels by 900 pixels for displaying game
// boards of different sizes.*

*// In order to handle any given board size, we scale the X and Y dimensions
// according to the board size.*

*// This results in the following visual effect: The smaller the board, the
// larger the squares*

// representing cells.

```

public static void show(int[][] board) {
    StdDraw.setCanvasSize(900, 900);

    int rows = board.length;
    int cols = board[0].length;

    StdDraw.setXscale(0, cols);
    StdDraw.setYscale(0, rows);

    // Enables drawing graphics in memory and showing it on the screen only when
    // the StdDraw.show function is called.
    StdDraw.enableDoubleBuffering();

    // For each cell (i,j), draws a filled square of size 1 by 1 (remember that the
    // canvas was
    // already scaled to the dimensions rows by cols, which were read from the data
    // file).
    // Uses i and j to calculate the (x,y) location of the square's center, i.e.
    // where it
    // will be drawn in the overall canvas. If the cell contains 1, sets the
    // square's color
    // to black; otherwise, sets it to white. In the RGB (Red-Green-Blue) color
    // scheme used by
    // StdDraw, the RGB codes of black and white are, respectively, (0,0,0) and
    // (255,255,255).
    for (int i = 0; i < rows; i++) {
        for (int j = 0; j < cols; j++) {
            int color = 255 * (1 - board[i][j]);
            StdDraw.setPenColor(color, color, color);
            StdDraw.filledRectangle(j + 0.5, rows - i - 0.5, 0.5, 0.5);
        }
    }

    StdDraw.show();
    StdDraw.pause(100);
}
}

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