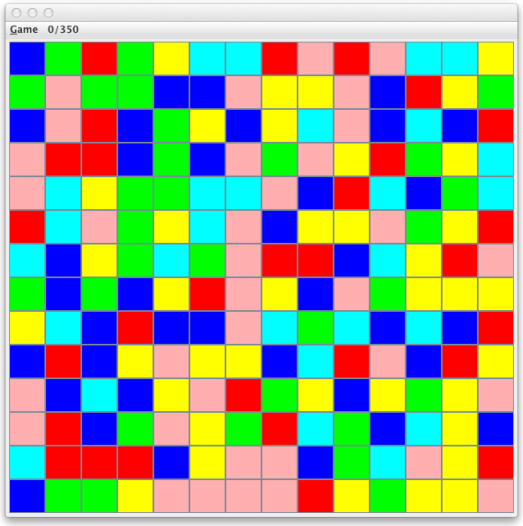
C343 Project - Flood-It!

1 The Game

Flood-It is a strategy game in which the player needs to flood the whole game board with one color in less than the allowed steps. Typically the board consists of 14x14 cells in random colors. The top-left cell is called a seed cell, and the region connected to the seed cell and with the same color is called the flooded region. At each round, the player chooses a color for the flooded region which may flood *adjacent* regions, expanding the flooded region. We say that a cell is *adjacent* to another cell if it is directly above, below, left, or right, that is, sharing a side with the other one. The objective is to flood the entire board, using the fewest color changes. One can imagine that the game becomes more challenging when the board has more cells and more colors are allowed.



2 The Project

We have written most of the game but we need your help in finishing it. We designed the game such that the computer may play the game (the autoplay mode), or a player plays it (the player mode). Note the current implementation of autoplay uses a silly algorithm: in each round, a color is *randomly* chosen. In the player mode, the player can choose a color for the flooded region by clicking a cell which displays the color. Want to be a smart player? Learn about the strategies at https://kunigami.wordpress.com/2012/09/16/flood-it-an-exact-approach/.

We would like you to write the `flood` function in the `FloodFunction` class. The flood() method is used for both the player mode and the autoplay mode. The `flood` function takes one parameter, color – an `Integer` of the color index, ranging from 0 to 5 (representing six colors). For more details about the integer-color mapping, check the `Constants` class. The flood function should change the color of the cells in the flood area to the chosen color (the

input), and expand the flooded area by including adjacent cells that share the same color as the chosen one.

You are to store the flooded cells in the member value `floodedList` of the `FloodFunction` class, which by default is a LinkedList. The `floodedList` initially contains the cell at the top-left corner (the seed cell).

The `FloodFunction` class contains some helpful functions : the functions named `up`, `down`, `left`, and `right` compute the coordinates of the adjacent cells; the function `in_bound` tells you whether a coordinate is on the board. You may use these methods to find adjacent cells to a given one.

3 Your Tasks

3.1 Implementation

Implement and test your flood() function. Push the entire package (including FloodFunction with your flood method, and other classes) to github@IU.

3.2 Analysis

The flood() method is called once in each round (when a color is chosen). So you can tell that the efficiency of the game is dependent on how smart the player (or the computer) is (to decide what color to choose at each round) and how efficient the flood() function is. Give a brief analysis of the time complexity of your flood() method.