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CMPT 103 Term Project

Segregation Modeling

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Description

- For the project this term we will build a modeling/simulation program that will show what happens if people living in a city want their neighbours to be the same as them.
- This program is based on a model of segregation developed by an economist named Thomas Schelling.

www.macewan.ca/ComputerScience

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The Idea

- The idea is fairly straightforward. If enough neighbours are similar, people stay. If not enough neighbours are the same, the agent will move.
- If the percentage of neighbours is below the "similarity threshold", the neighbour is dissatisfied.
- This similarity threshold can be changed to see how it affects segregation.

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Starting setup

- *Agents* are placed randomly in a grid. A 50/50 split of each type and some portion of spaces are empty

Agents placed randomly in grid

X	X	O	X	O
	O	O	O	O
X	X			
X	O	X	X	X
X	O	O		O

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Satisfaction Threshold

An agent is either satisfied or dissatisfied based on whether a threshold of neighbours are the same as them. Here are threshold of 30% might be used

Satisfied because 1/2 (50%) of neighbors are X

X	X	O	X	O
	O	O	O	O
X	X			
X	O	X	X	X
X	O	O		O

Dissatisfied because only 1/4 (25%) of neighbors are X

X	X	O	X	O
	O	O	O	O
X	X			
X	O	X	X	X
X	O	O		O

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Moving

Each *round* dissatisfied agents will be moved to a random open location. In the below example, dissatisfied agents are marked with an asterisk(*)

Dissatisfied agents marked with *

X	X*	O	X*	O
	O	O	O	O
X	X			
X	O*	X	X	X
X	O	O		O*

All dissatisfied agents relocated

X		O		O
O	O	O	O	O
X	X	X		X
X		X	X	X
X	O	O	O	

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Rounds

- Each *round* or *step* your program will find the dissatisfied agents and move them to a new location.
- Note that empty squares are not included in the satisfaction calculation.
- All dissatisfied agents are moved each round.

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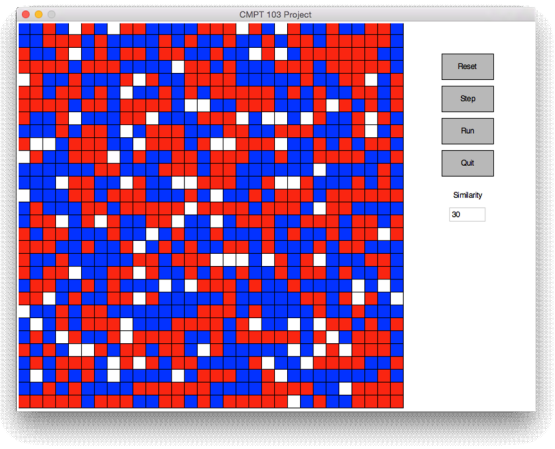
Screenshot



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The Grid

- The simulation consists of a 30 x 30 grid of squares. 10% of the squares are empty (white) and the remaining squares are equally divided between red and blue.
- Each square must be 20 pixels square
- Each square represents an agent
- Each agent can have between 3 and 8 neighbour squares.

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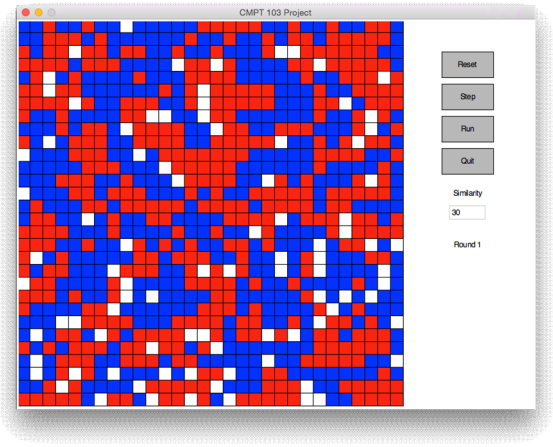
After 1 Round



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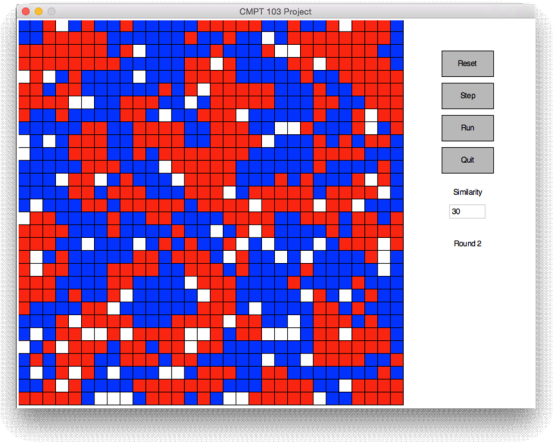
Round 3



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Segregation

- You can see that even within three *rounds/steps* that the segregation becomes apparent.

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Buttons

- Your program must implement 4 buttons
  - Reset
    - Reset the board to a random layout with 10% blank and the others evenly red/blue
  - Step
    - Perform one round/step
  - Run
    - Perform rounds/steps until changes are “minimal”
  - Quit
    - Close the window and exit the Python program

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Input

- There is one input text box with a label “Similarity” that allows you to modify the similarity threshold that determines if agents are satisfied or not.
- Modifying this input allows the user to experiment to see how fast segregation occurs with different thresholds

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Run

- When “Run” is clicked your program should perform rounds of moving dissatisfied agents until the map is not changing much
- You will have to decide what a good *stopping condition* will be and clearly document it

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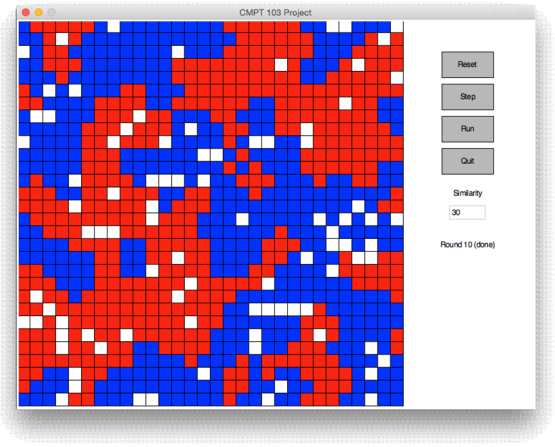
After Run has completed



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Submission guidelines

- The project is due Friday, June 17th
- Milestone 1
  - Due June 3
  - Draw board and quit when “Quit” clicked
- Milestone 2
  - Due June 10
  - Randomize board when “Reset” clicked
- Further marking details to come…