Modelling and Simulation

Simulation of Segregation Model using Agent Based Modeling

Guide : Prof. Mukesh Tiwari
DAIICT

Mauli Shah 201501132
Prithvi Patel 201501230
Ekta Bhoraniya 201501402
Swastika Nayak 201501423

Model

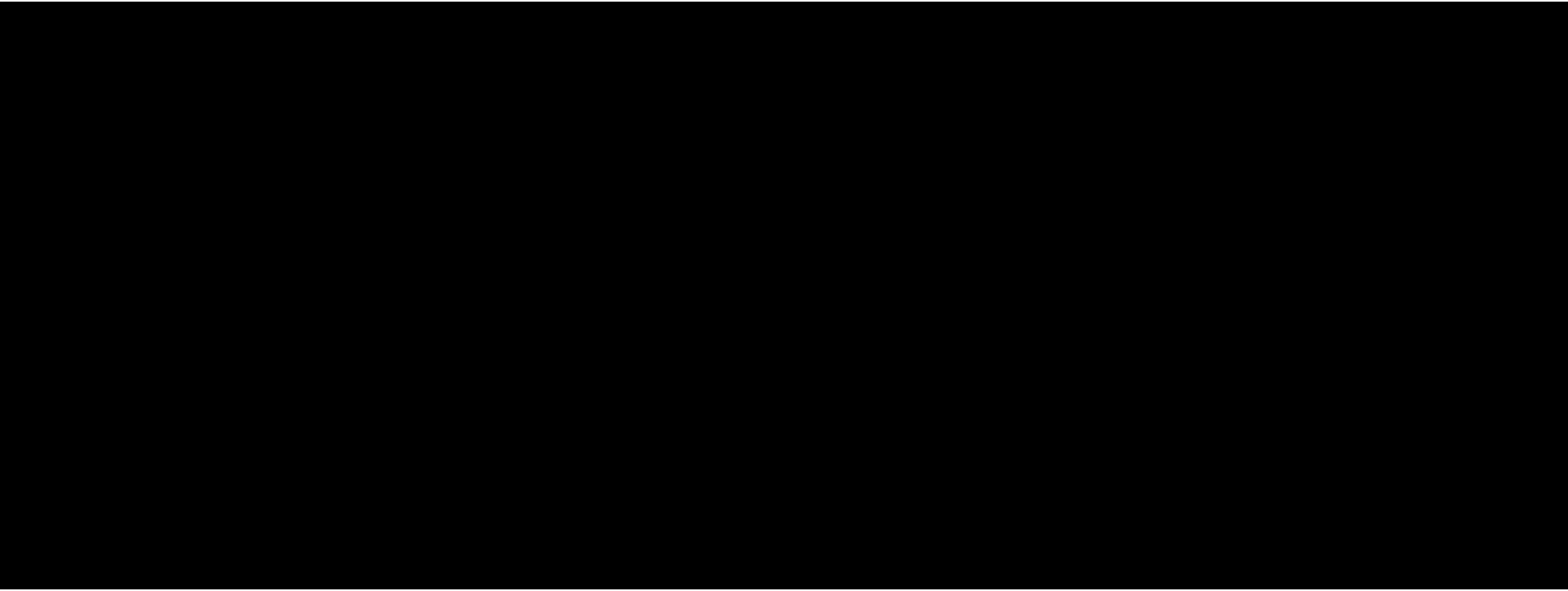
Segregation model is an agent based model where the unhappy agents try to relocate to those places where they could be happier that is where they find a certain number of similar neighbours, thus giving rise to patterns which may not have been intended.

- Red and Blue denotes the two types of agents with two different traits, who occupy the cells.
- The relocation has been done using 2 ways -
  a) Schelling’s model b) Modified Schelling’s model

Model

- All the agents have same $h_{threshold}$, which denotes that an agent atleast requires $h_{threshold}$ fraction of same neighbours in the Moore neighbourhood of 3X3.
- Happiness value of an agent denotes the ratio of similar neighbours to total agents in the neighbourhood
- r_{prob} denotes the probability by which a happy agent relocates.
- There are $empty_p$ percentage of empty spaces in the grid which are present for the movement of the agents.

Schelling's Model vs Modified Schelling's Model:

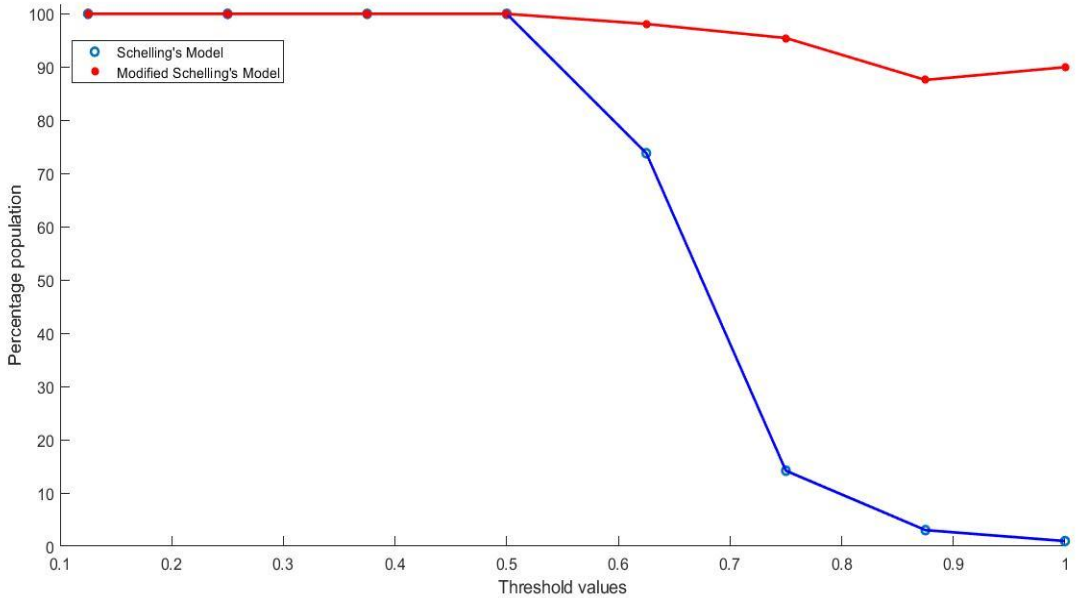


Schelling's Model

Modified Schelling's Model

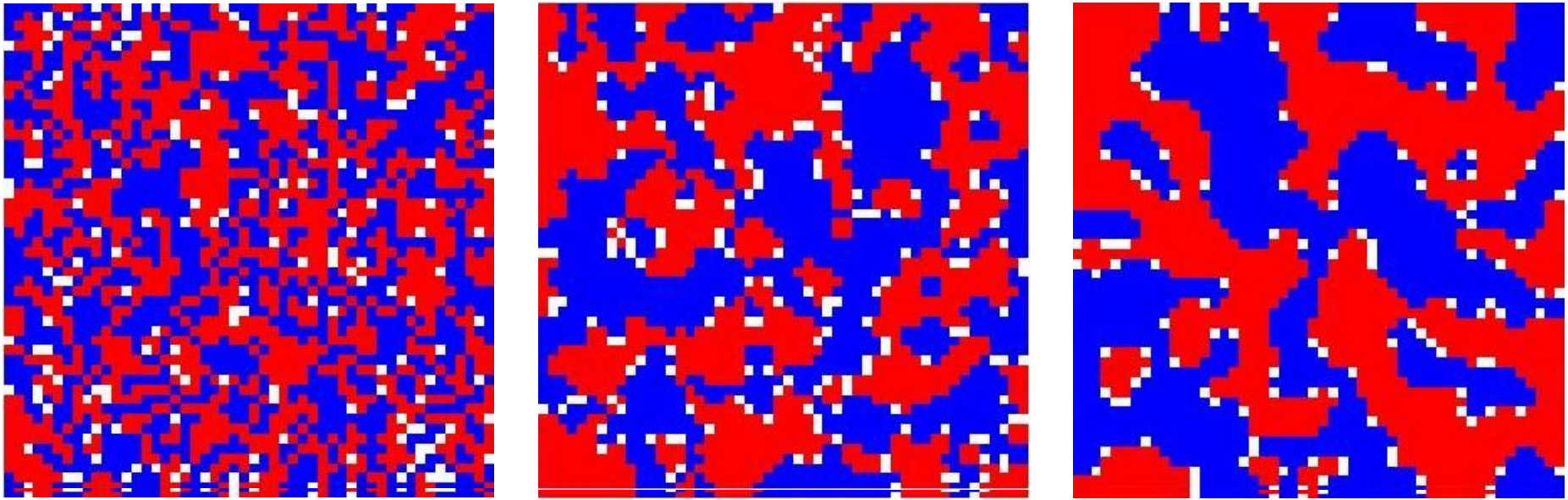
Both models are shown for Red:Blue = 50:50, $h_{threshold}$ = 0.875, r_{prob} = 0, $empty_p$ = 5%

Schelling's Model vs Modified Schelling's Model



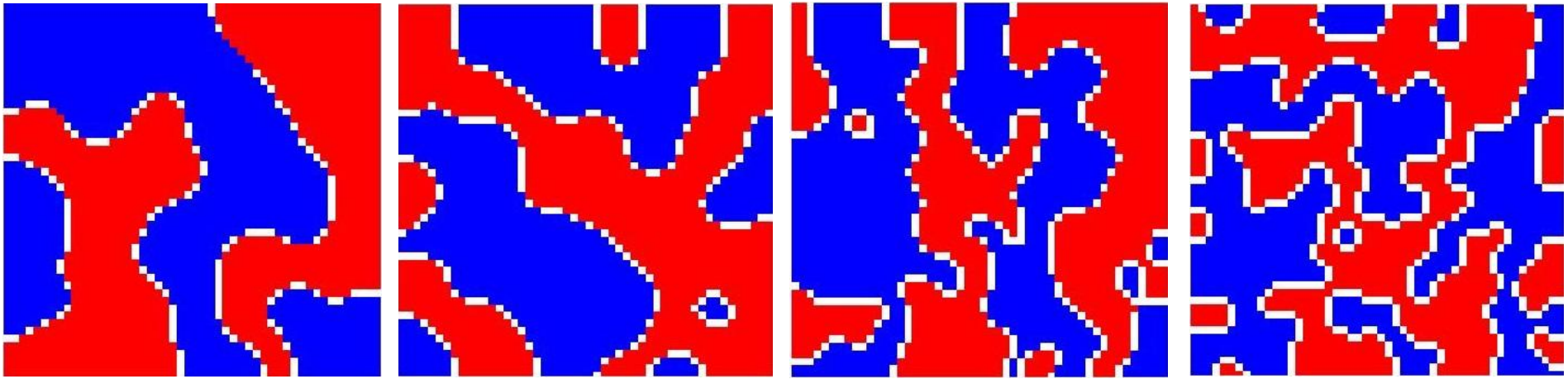
The final proportions of the happy agents out of the total occupied space are shown for varying $h_{threshold}$ with r_{prob} = 0, and Red:Blue = 50:50 and $empty_p$ = 5%

Integration and Segregation



Final position when $h_{threshold}$ = 0.25, 0.33 and 0.42 from left to right.
r_{prob} = 0, empty cells = 5% and red : blue = 50:50

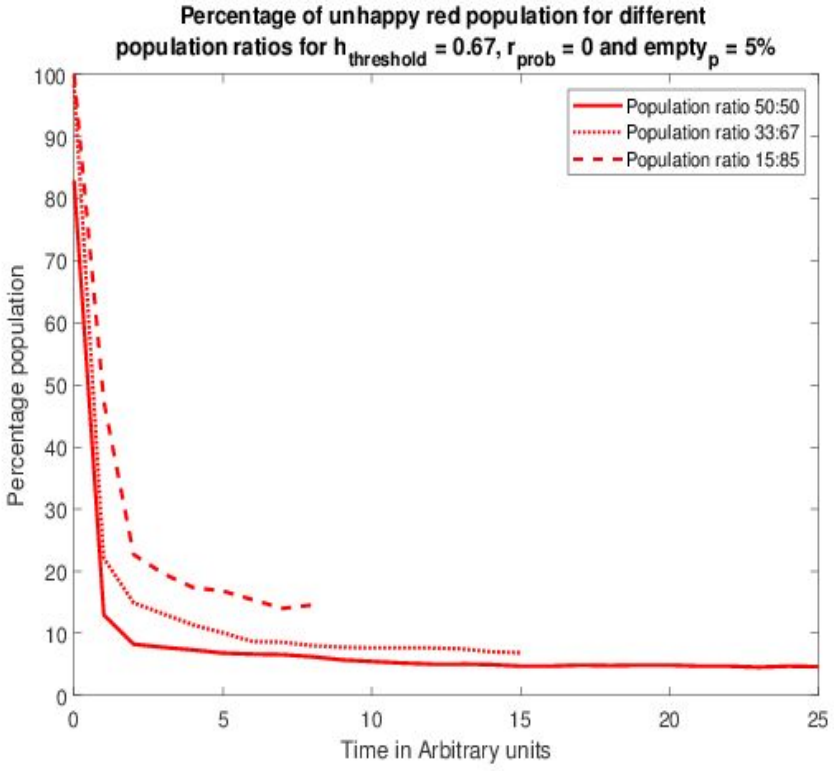
Varying empty cells

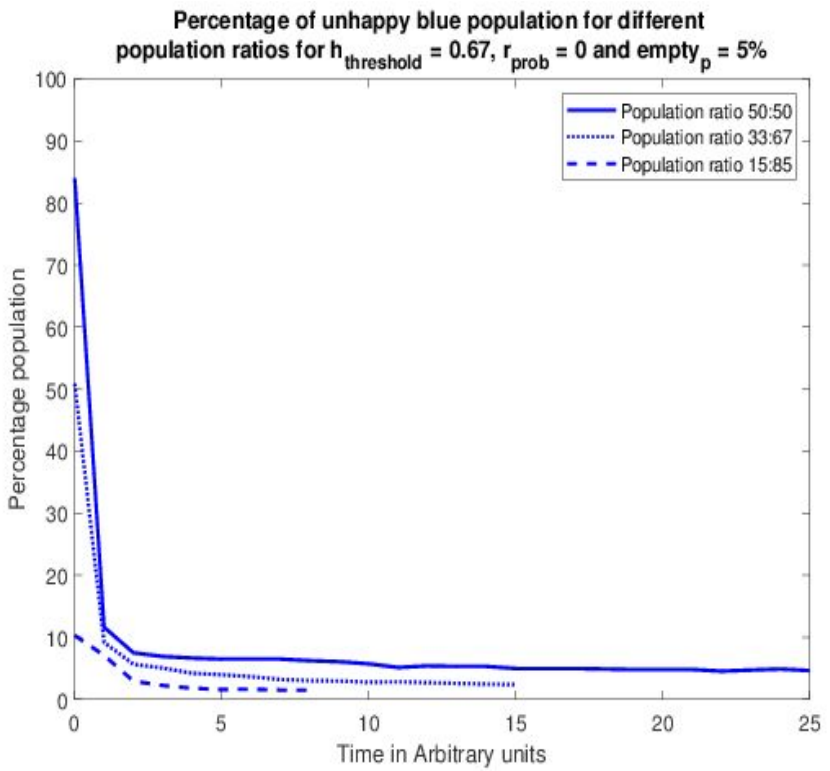


Final position when empty cells percentages are : 5%, 7%, 10% and 15% from left to right.

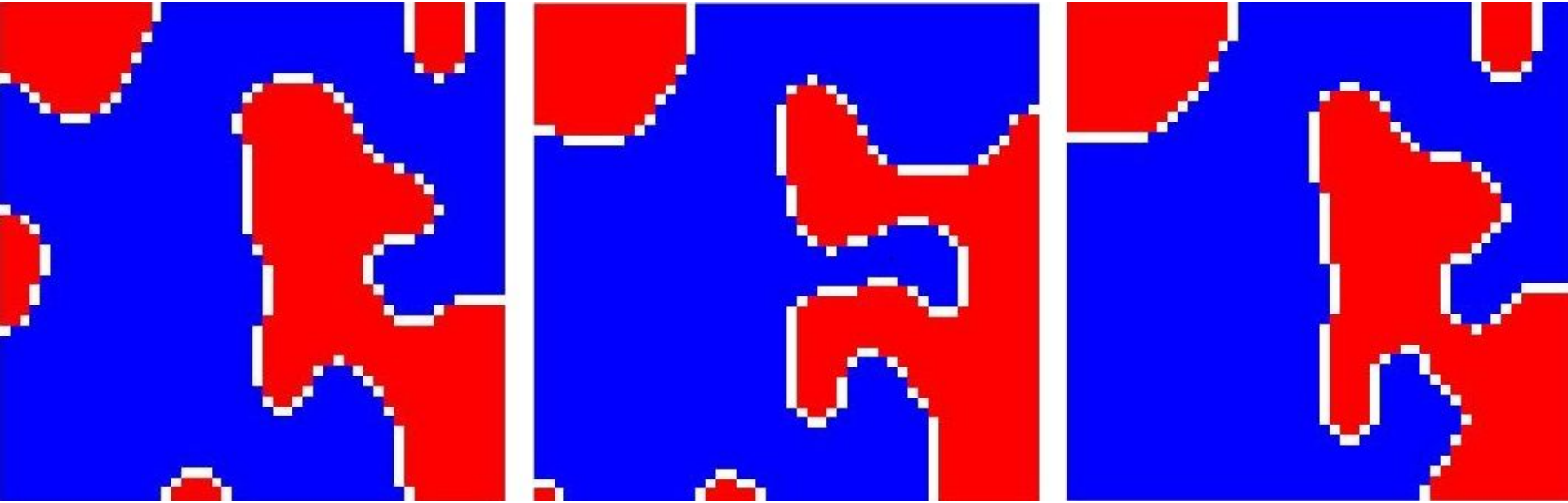
$h_{threshold}$ = 0.67, r_{prob}= 0, red : blue = 50:50

Varying population ratios





Varying r_{prob}



Final position when r_{prob} = 0, 0.2, 0.5 from left to right.
$h_{threshold}$ = 0.67 , $empty_p$ = 5% and population ratio= 33% of the occupied grid

Thank You