Epidemic Simulation Report - Final

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Object Oriented Analysis and Design

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Which Design Patterns?

Since we'll have interacting individuals we have to provide a timer. In order to simulate interactions between individuals according to their current times we have to keep track of their states. Therefore I used ***State Design Pattern*** *in order to keep their states in maintainable way.*

In order to simulate interactions between individuals I used ***Mediator Pattern****. Since we have multiple objects from same class and we want to avoid direct communication between them it's logical to use mediator pattern.*

Explanation of Classes

Individual.java

This class holds the attributes of a single individual.

State.java and its descendants

State class has the all states that an individual can have. They're:

- Healthy_Moving
- Infected_Moving,
- Healthy_Interacting,
- Infected_Interacting
- Hospitalized,
- Dead

Constant.java

This class keeps the constants like Po, R,Z,B.

Hospital.java

This class controls the patients in Hospital. It doesn't use producer/consumer paradigm. It uses FIFO logic in order to simulate the actions in hospital.

GUI.java

This class has the GUI components.

Mediator.java

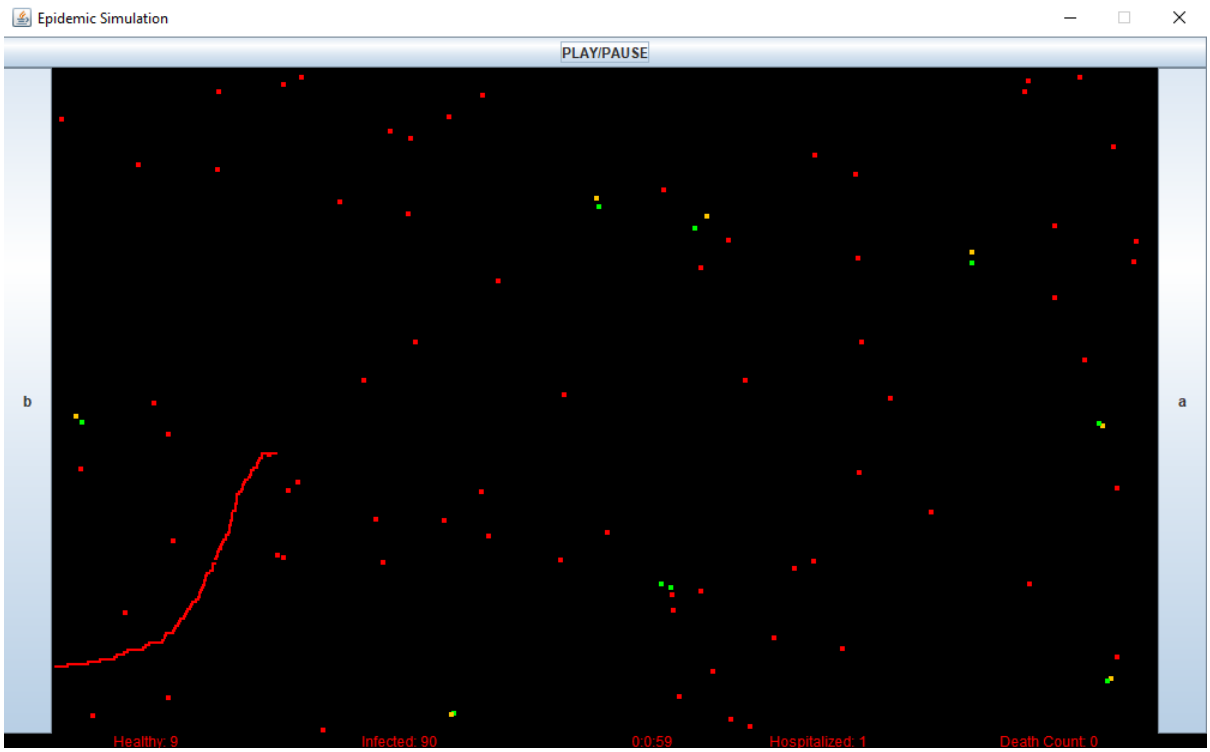
This class is the ancestor of Mediator Interaction class.

MediatorInteraction.java

This class iterates all of the individuals and change their states according to their locations.(If they're are intersecting or not.

Elements of GUI

- White rectangles are representing healthy moving individuals.
- Green rectangles are representing interacting healthy individuals.
- Red rectangles are representing moving infected individuals.
- Orange rectangles are representing interacting infected individuals.
- Play/Pause button pauses/continues the simulation.
- "a" button at the right adds single infected individual to our canvas.
- "b" button at the left adds multiple infected individuals. It's set to 50.



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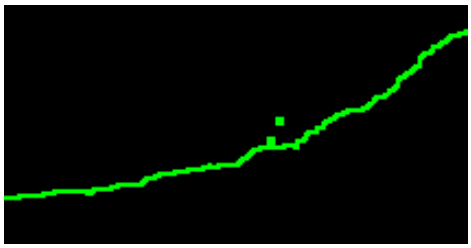
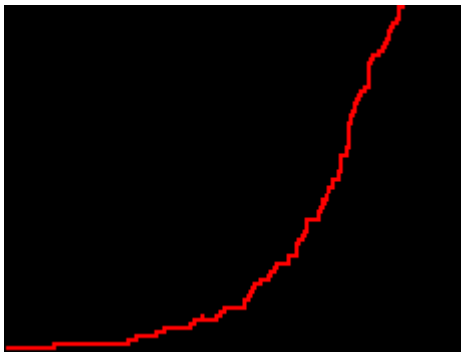
Changes in the graph according to variables:

After setting most of individuals with mask and good social distance I got a graph like this in t times:

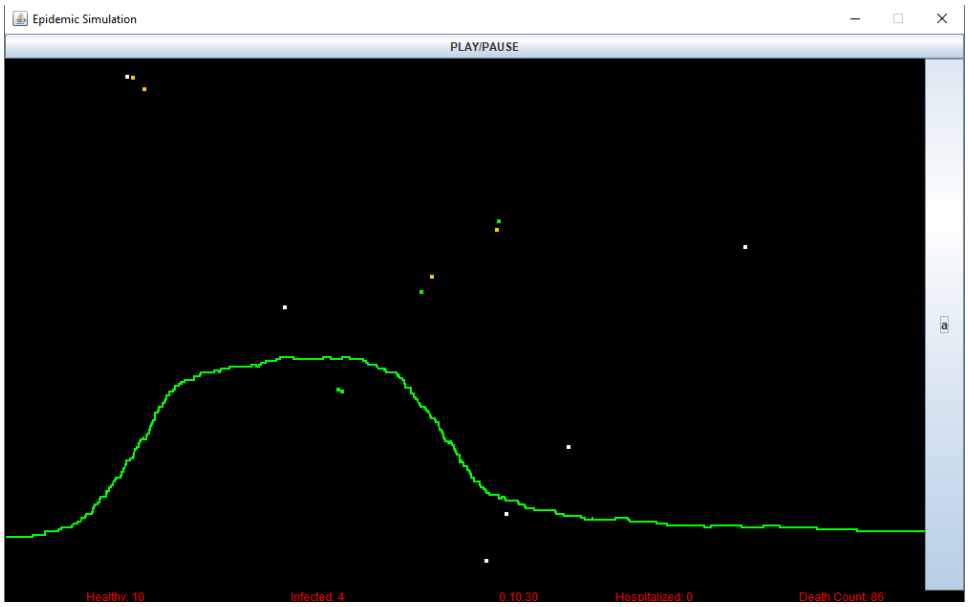


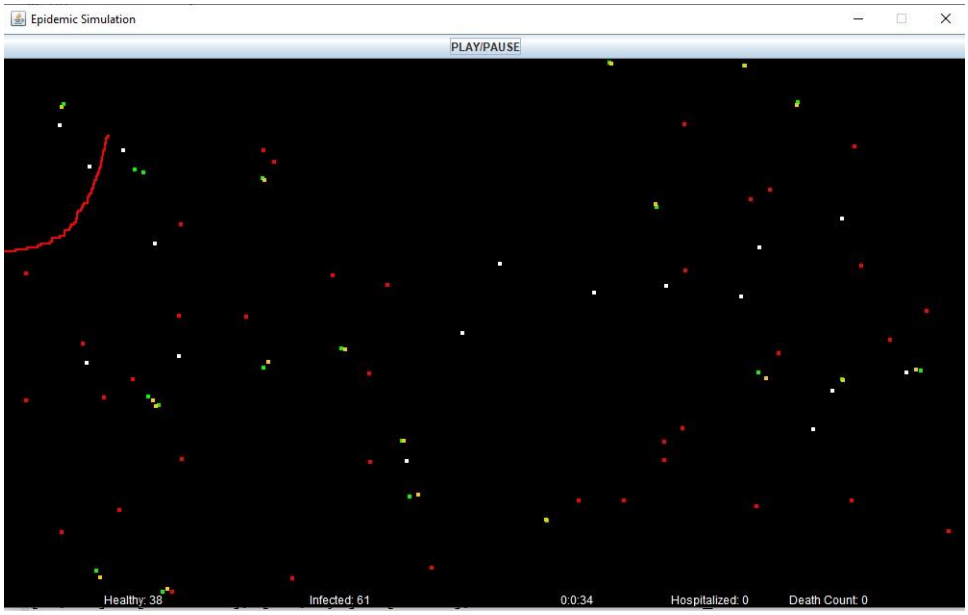
After setting most of individuals without mask and bad social distance I got a graph like this in t times:

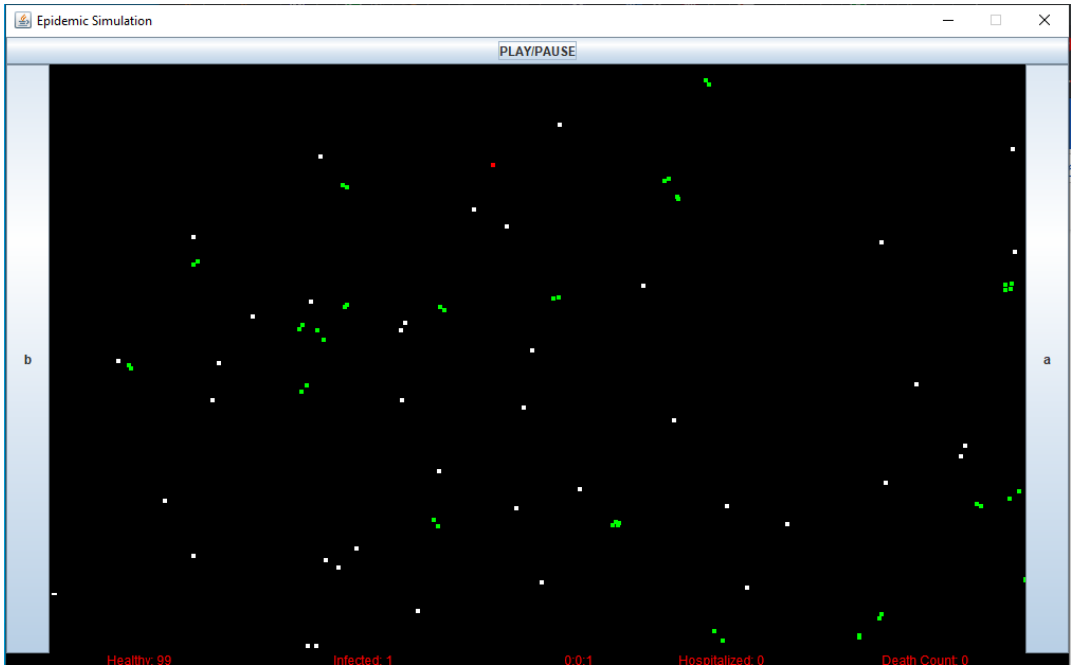


Obviously with the good social distance and masks the curve is flattened.

Evolution of a program with screen shots:

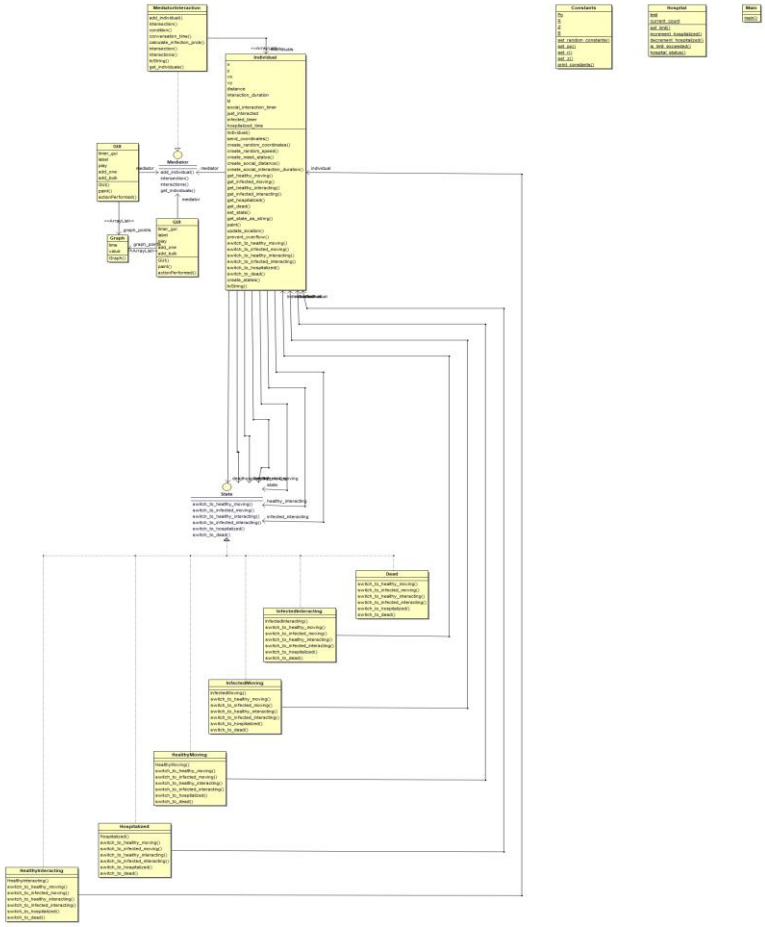



Epidemic Simulation
PLAY/PAUSE
Healthy: 38
Infected: 61
0:0:34
Hospitalized: 0
Death Count: 0


Epidemic Simulation
PLAY/PAUSE
b
a
Healthy: 99
Infected: 1
0:0:1
Hospitalized: 0
Death Count: 0

Class Diagram:

The class diagram is so big that doesn't fit here. I also have it in my folder.



Self Evaluation and seen bugs in the program:

The GUI is not good in terms of looking. I have so many if else conditions inside the Individual class even though I'm holding states on it. Sometimes 1% of the population can get stuck in interacting mode. This is a seen bug. The program needs changes in code for different parameters. I haven't had enough time to make a generic GUI.