

Gebze Technical University

CSE443 Object Oriented Analysis and Design

Final Project Report

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# 1 Epidemic Simulator

In this project I designed and implemented a visual simulation of an epidemic within a human society.

The program displays small squares moving those squares represent individuals, individuals socialize with others and move around, they can get infected, they can go to hospital and they may die.

Interactions between individuals controlled by mediator and all those components (individuals, hospital, mediator) make up the society.

Graphical user interface is refreshed every 20 milliseconds, so it is quite smooth and stable. Every time interface refreshed, society and all its member components are updated then rendered.

For the design of the Individuals I used state design pattern user has 5 different state and they have two common function but the behaviour are different, state classes implement the state interface and states constructed with the individual.

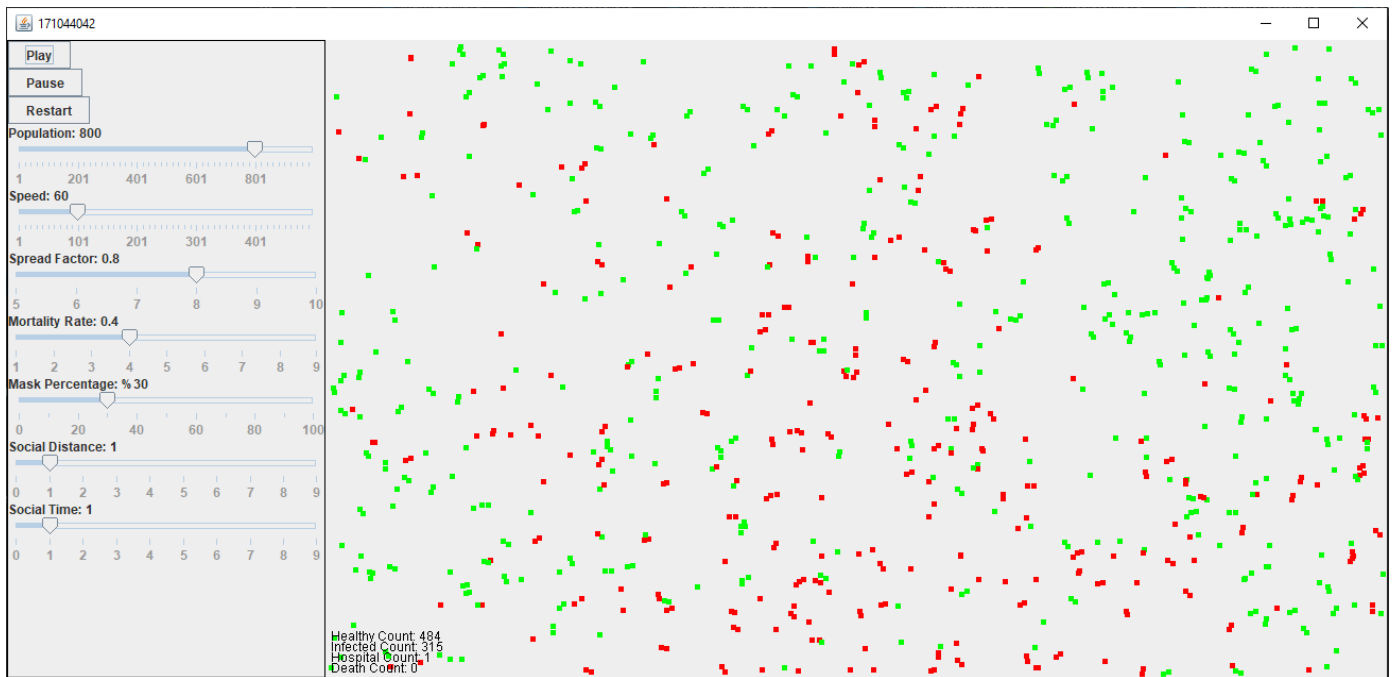
I also used mediator design pattern for controlling the interaction between the individuals. Every individual is constructed with same mediator and individuals also register to the mediator. Mediator checks for the collisions and assigns new states to the individuals. Also counts of the healthy, dead, infected and hospitalized individuals are made here.

There is no synchronisation problem while entering and exiting the hospital, mediator handles the checks and only one individual can enter or exit at a time.

The graphical user interface uses a timer thread to update and render the society canvas.

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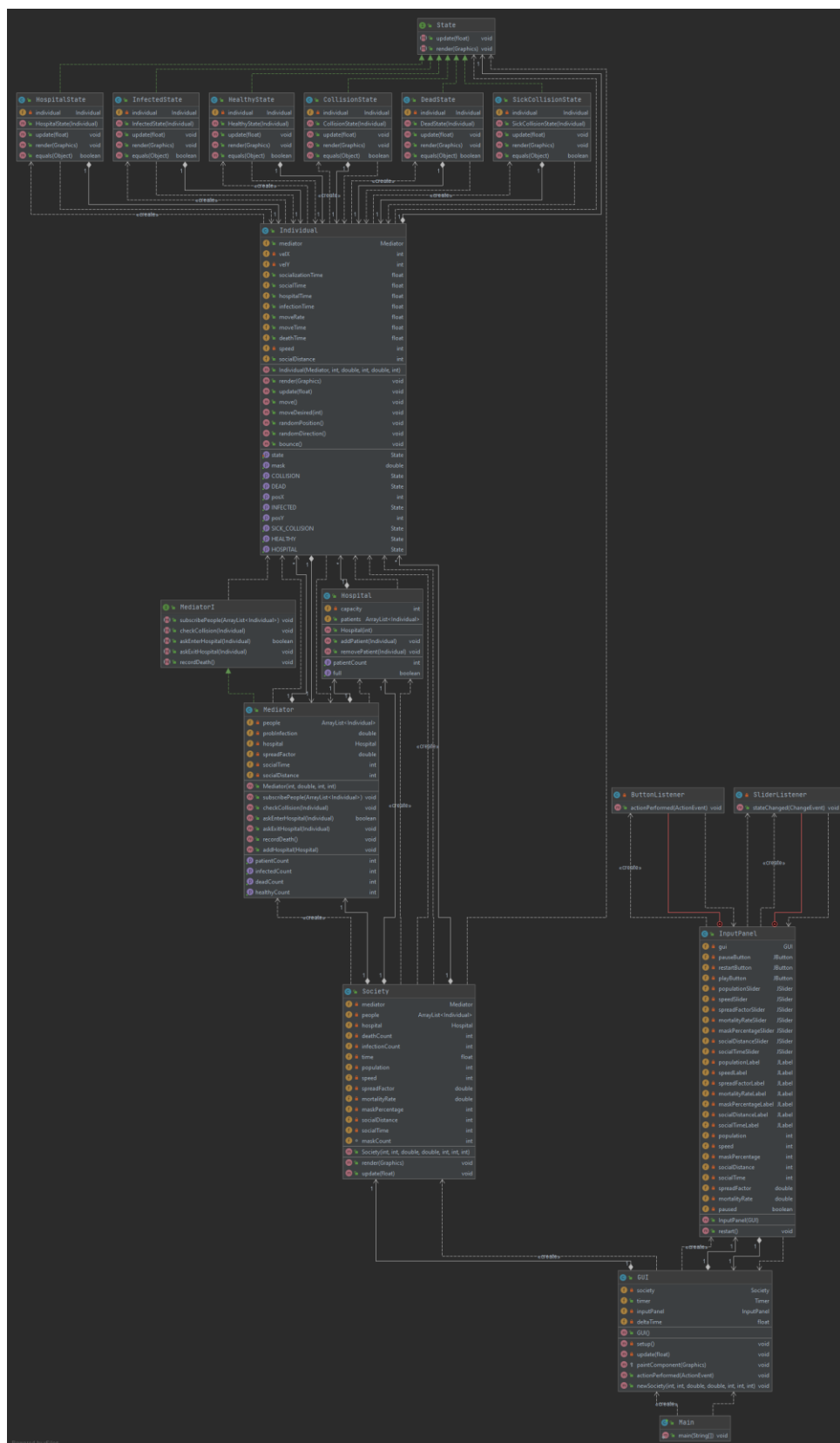
## 1.1 Outputs



You can play, pause and restart the program using the buttons. You can pause the program, change the values using sliders then restart with new values.

## 1.2 Class Diagrams

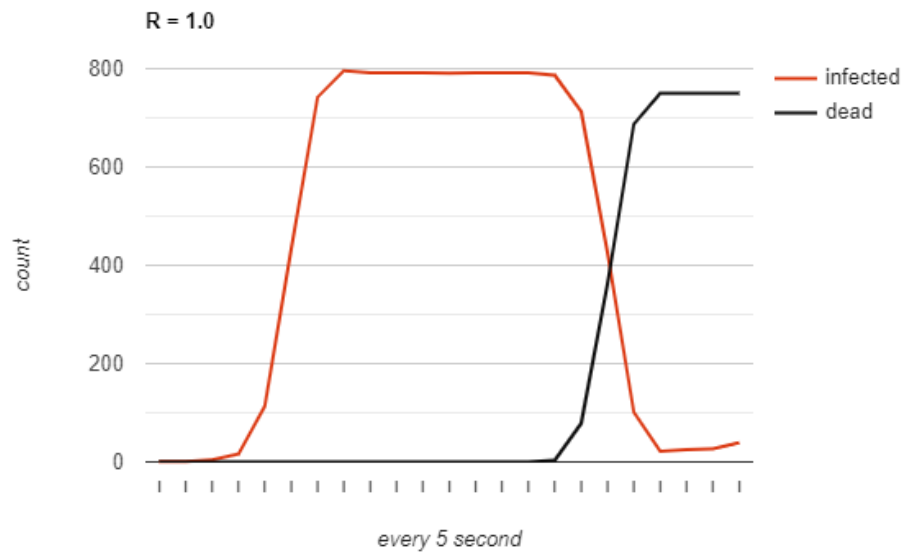
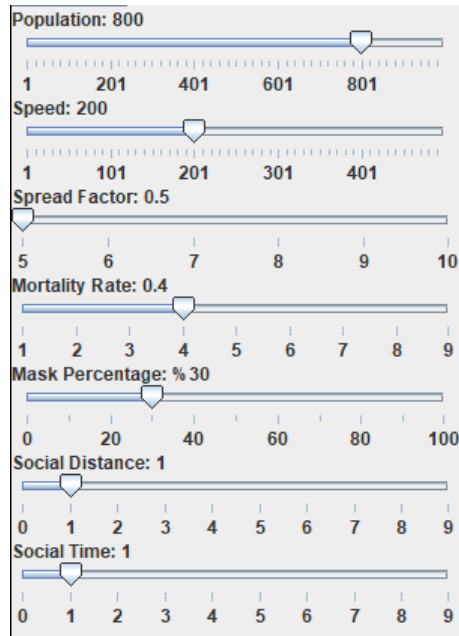
A class diagram with better resolution is in the project folder.

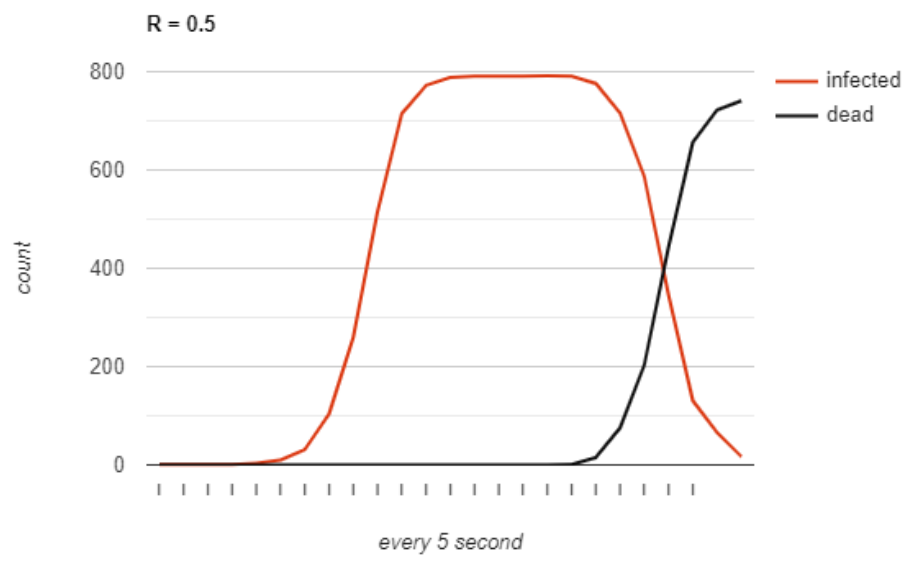
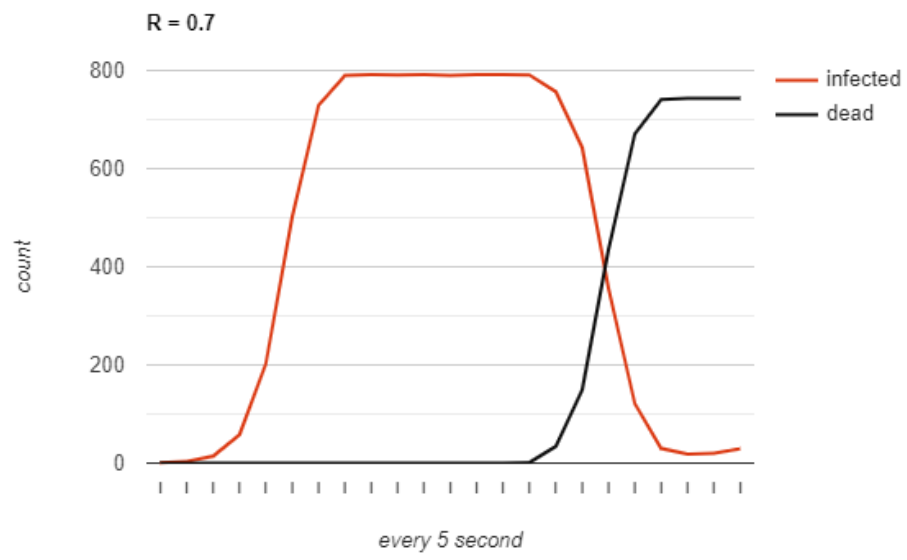


## 1.3 Graphs

### 1.3.1 Change Depending R (Spread Factor)

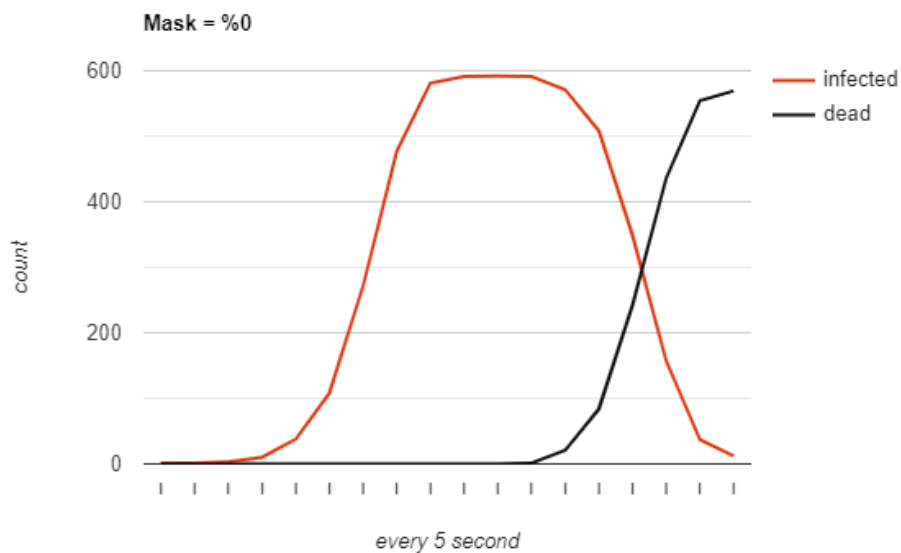
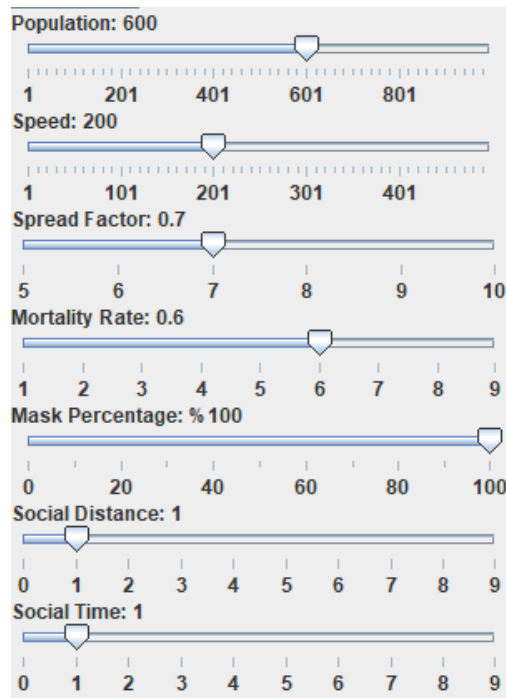
With these setting only R (spread factor) value changed and graphs are generated. As the R decreases individuals die later than before.



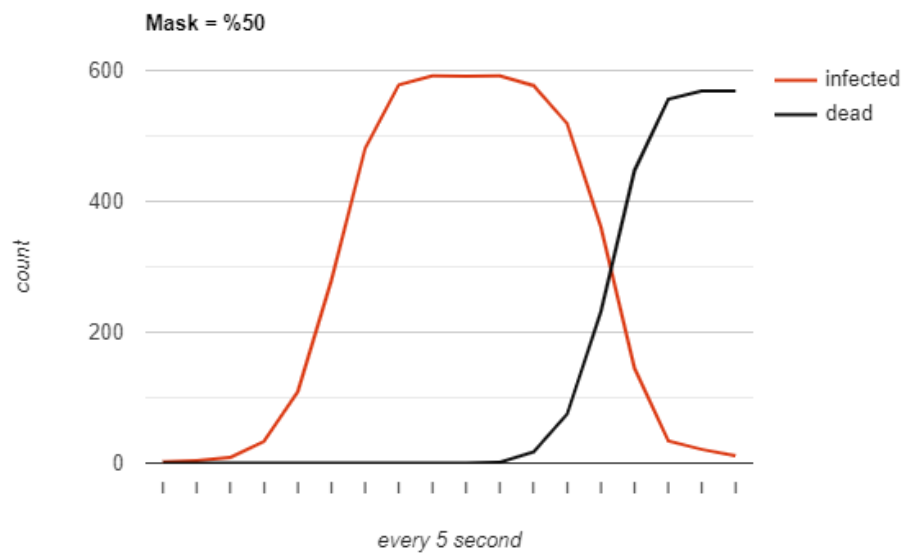


### 1.3.2 Change Depending Mask Usage Percentage

Settings below used only mask value changed, and graphs are generated. The more mask used the less chance individuals have, to get infected. As seen in third graph epidemic stops before even it has a chance to start.

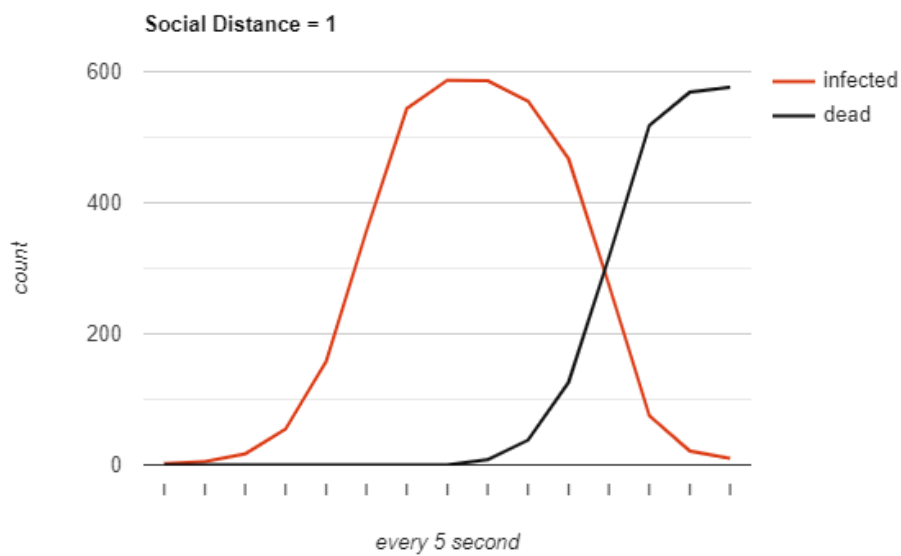
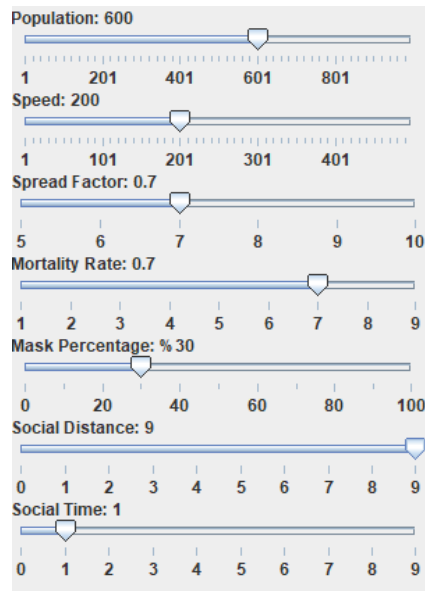






### 1.3.3 Change Depending D (Social Distance)

Settings below used and only D (social distance) value changed and these graphs are generated. Social distance here represents the distance people can collide together. Individuals die earlier since they get infected earlier by colliding people from distance.





### 1.3.4 Change depending Z (Mortality Rate)

Settings below are used and only Z (mortality rate) value changed then these graphs are generated. Individuals starts to die faster as rate increases.

