Spread of epidemic

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1 Introduction

When disease spread quickly and affect many people we can call it epidemic. Some of the most unfamus epidemic thorough history are XIV century Black Death and Spanish Flu pandemic in 1918. Infected person is not significant, however when a great number of people is sick it creates serious health and economic threats. Goal of simulating spread of epidemic is to better understand how epidemic behave in time, how quick it spreads depending on many factors.[**?**] It can also be used to picture how vaccination affect disease spreading and confirms that herd immunity is important.

2 Literature models

Main models for epidemic in cellular automata are as follows:

- SIR
- SEIR
- SIS
- SEIRS

where each letter stand for status types of persons:

- S - susceptible
- I - infected
- E - exposed
- R - recovered

The model we choose should represent a disease we want to model. SIR model assume that in recovery status individual get full immunity and on the other hand in SIS person can get sick even after successful treatment.[3]

The neighborhood we choose can greatly affect dynamics of disease spreading as stated in [2]. However more than type of neighborhood the type of connection between cells is important. There can be one, two three or none ways of transport. It affects equations and speed of spreading.[3]

3 Project goals

The aim of this project is to implement in JAVA a cellular automata model of epidemic spread. Main programming reference will be code from laboratory classes where cellular automata was used. The UI will be created with JavaFX and SceneBuilder. If possible interface will have may parameters to choose, like: vaccination value, people spread in board(random,uniform, constant), epidemic model(SIR,SIS,SEIR,SEIRS), neighbourhood size and type, if not only simple parameters for one model will be present.

Bibliography

[1] epidemic.

[2] Baki Cissé, Samira El Yacoubi, and Abdessamad Tridane. Impact of neighborhood structure on epidemic spreading by means of cellular automata approach, 06 2013.

[3] S. Hoya White, A. Martín del Rey, and G. Rodríguez Sánchez. Modeling epidemics using cellular automata. *Applied Mathematics and Computation*, 186(1):193 – 202, 2007.