

PROJECT PROPOSAL

SIMULATING THE SPREAD OF THE EBOLA VIRUS USING A CELLULAR AUTOMATON FRAMEWORK IN A PARALLEL COMPUTING ENVIRONMENT

ABSTRACT

The aim of this document is mainly to help us as a team. I should help us to get to know each other and learn to think as a team. On the other hand, the project proposal should give us a short introduction to the project, which addresses the topics viruses, cellular automaton, and parallel computing.

WHO WE ARE

Dylan Hallissey

B00089794



24 Years

Born in Dublin, Studying in ITB since 2017 now called TUD In year 4.

Nicolae Salagor

B00124666

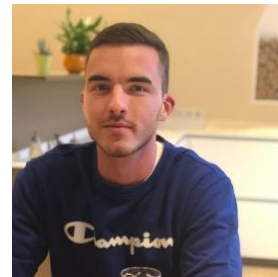


21 Years

I am from Moldova, 8 years now in Ireland-Dublin. Studying IT Computing in TUD 3 year. Have some good layout design skills.

Peter Fischer

B00148808



22 Years

exchange student from Austria. Student and Java developer at a telecommunication company in Vienna.

RESEARCH

[Nicolae and Dylan] (Ebola virus, 2D model - SIR / SEIR, cellular automaton)

Ebola virus is an infectious disease that started from a probable zoonotic transmission, followed by human-to-human spreading due to direct contact with each other.

In this project we selected SIR as our 2-D model.

S – Susceptible

I – Infectives

R – Recovered

The model was made to explain the Ebola Virus outbreak. In SIR model the transmission of Ebola Virus can only occur through direct contact between susceptible individuals to the infectious individuals.

A cellular automaton is basically a grid of cells. Each cell has a state and is controlled by pre-defined rules for infections...

PROJECT PLANNING

The goal is to simulate the spread of the Ebola virus in a parallel computing environment using a cellular automaton model. At first, we will define our specific SIR or SEIR model. We will define rules for the spread of the virus and how these rules affect the different states the simulated cells could be in. Next, we will write pseudo code and create flow charts for our defined model. This process should be finished by the reading week, then we will start coding.

In and after the reading week, will develop one serial and one parallel C program, these will be compared by their computational performance. Both programs will simulate cells in a pattern. Each cell will have a state. Moreover, each cell is dependent on the states of their nearby cells.

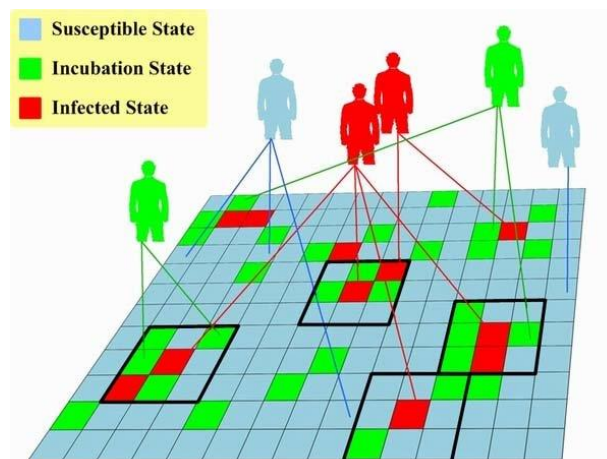


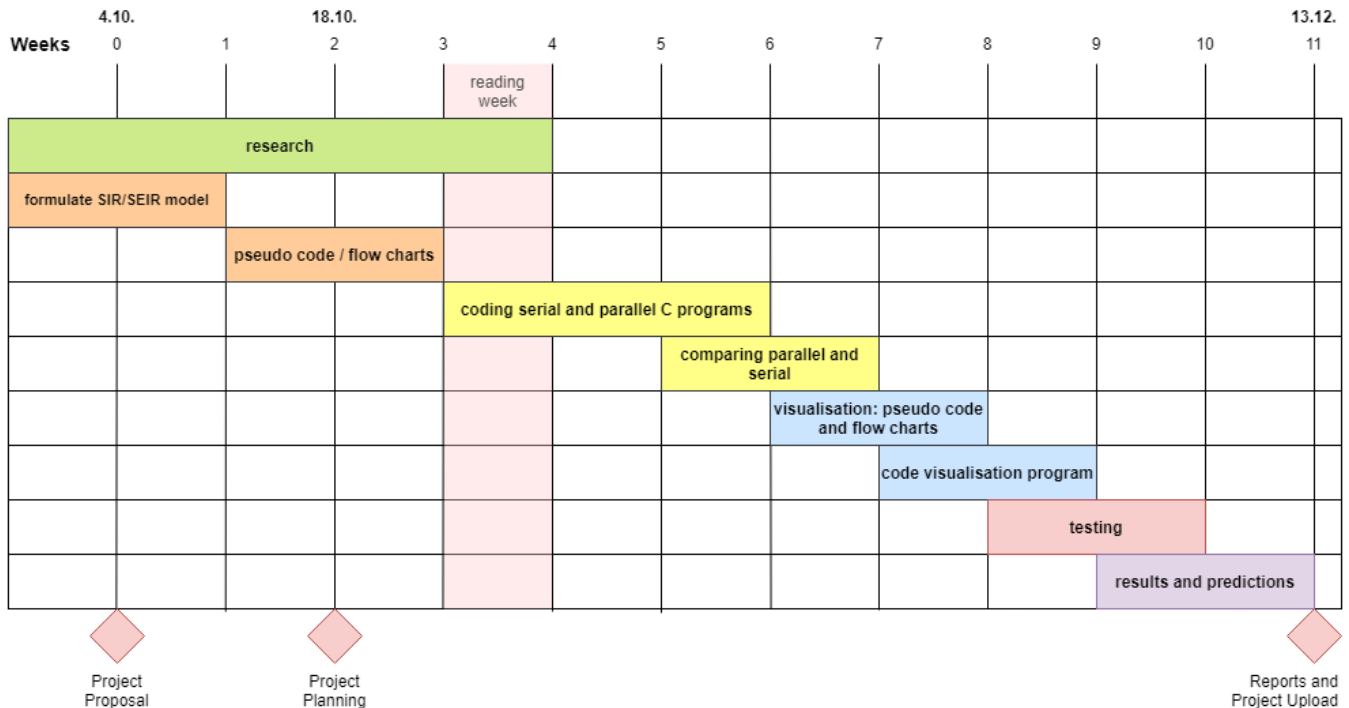
Figure 1: model of cells and their states¹

After coding the programs, we will create flow-charts and write pseudo code for a separate program, which should visualize the progress of the simulation over time. After finishing this program, we will test if there are any bugs in the code and we will check, if the code is structured well. In the end, we will generate results of our codes and findings.

We created a detailed Gantt-chart to sum up the tasks and phases of the project. This chart was made with Draw.io, a free online tool for drawing any kind of charts and models.

¹ **Figure 1:** Huang, Chung-Yuan & Sun, Chuen-Tsai & Hsieh, Ji-lung & Lin, Holin. (2004). Simulating SARS: Small-World Epidemiological Modeling and Public Health Policy Assessments. Journal of Artificial Societies and Social Simulation. 7. Retrieved from https://www.researchgate.net/figure/Cellular-automata-with-mirror-identity-model-CAMIM_fig1_5140421 on 3.10.2021

GANTT CHART



TOOLS WE WILL USE



The Tool we use to communicate to each other is **Discord**, an instant messaging and digital distribution platform. On Discord, users communicate via voice calls, video calls, text messaging, media and files in private chats. Therefore, Discord is especially useful platform which be perfect to video call and text related to our project. **Microsoft Teams** is also another planform similar too discord that we can use as a backup.

Microsoft 365 which It includes office 365 webapps Word, Excel, Outlook, PowerPoint, OneNote. If anyone of us in the group need to email each other, we can use outlook or if we are doing document and when we want to edit the document, we can use Microsoft office to share the files and for writing together on files for the project.

Another tool we will be using is **GitHub**. GitHub is a code hosting platform for version control and collaboration. It allows us to work together on the project and we be able to send the code on GitHub. It means that we can work on a code together and share it to each other. Moreover, we can create different branches for new features. This allows us to test new features, before merging them into the main branch.