

Model of a Virus Outbreak on a Contained Population

CJ Cahill

1. ABSTRACT

With the rapidly increasing population of the world, it is getting more and more likely that a virus or bacterium will cause an epidemic. This is a major problem because if an epidemic were to occur, then possibly the majority of the world's population could be looking at death or life-altering events. This is where the simulation comes in. It will be able to predict how a virus will spread through a population, and then others can design defenses to stop that virus from affecting the entire world.

2. INTRODUCTION

The entire project consists of two main parts. The first part is determining what the values of the various variables for a certain virus will be. The death and recovery rates will not be hard since that data is available for common (and a lot of uncommon) viruses. Birth rate is determined by the population itself, as is the average lifespan of a person. The hard variable to determine will be the infection rate. This will be more subjective since there is no hard data retaining to this subject. After all the variables are determined then the program will be run. This is the second part of the project. At the beginning of testing the viruses used will have data from previous outbreaks so that the program may be calibrated so accurately reflect the known data. The data from the program will be outputted to a file that will then be read by a Matlab script to generate an easy-to-read graph.

3. BACKGROUND

There have been some previous study on virus modeling, but there has not been enough considering the threat a potentially deadly virus epidemic could be. A virus can spread through several ways, including air, blood, and other bodily fluids. One group did a simulation of Hepatitis C, also within a contained population. They wanted to measure how different variables affected the time it took the virus to infect 95% of the population. This is useful for this project because they also used Agent-Based Modeling and their code could then prove useful for fine-tuning this program.

4. PRELIMINARY TESTING / ANALYSIS

The program has gone through some testing, but not yet with any known virus, just with some arbitrary numbers. The program has reached the point that it should be able to handle some simpler viruses, and this will tested upon during the next quarter.