Simulation of the Spread of a Virus Throughout Interacting Populations with Varying Degrees and Methods of Vaccination

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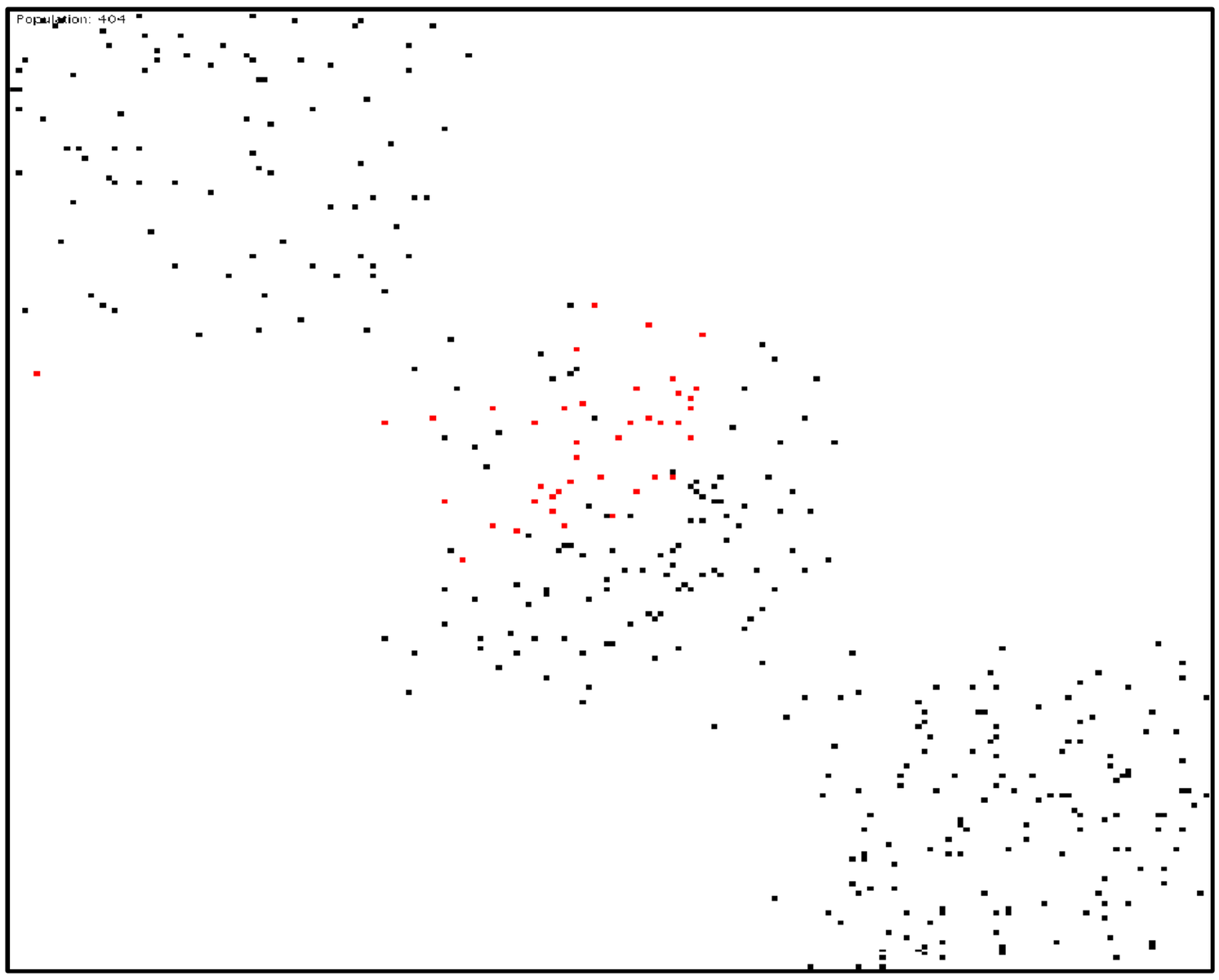

This project is designed to expand upon the common agent-based simulation of a virus infecting a very generic population. Factors such as multiple populations, different forms of transportation, and social interactions will be accounted for. Different maps with different types of pseudo-random populations will be created and different types of existing and fictional viruses will be simulated. Once working models are finished, the effects of vaccinating parts of the population can be modeled to determine the most effective methods and minimum percentages of vaccination needed to stop a viruses spread.

In order to create this simulation, my plan is to start off with a basic agent-based model, showing an extremely simple population with random movement, with basic mass vaccination and virus spread. I will use this as a stepping stone to implement more advanced modeling. Resources I will need are primarily limited to research papers already written and calculated values relating to different viruses.

Visuals of my project will include charts showing the frequency of people sick, deaths, people vaccinated, people recovered, etc. as well as maps that show incremental snapshots of the viruses spread.

The error analysis will be somewhat limited, but will primarily consist of comparisons to real world epidemics and the results of models by other researchers and scientists.

At a minimum, in its final form, my simulation should be able to model small sections of modern real-life populations as well as past populations, such as medieval villages. It should be able to track to an extent the interaction of different populations and how that affects the spread of a virus. Simulating vaccinations by the "trace" method is of a lower priority than mass vaccination, but will still be programmed to some degree.