Modeling Virus Spreading in a Modern Environment
TJHSST Senior Research Project
Computer Systems Lab 2009-2010

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Fall 2009 – Spring 2010

Abstract

This project explores the development and use of a real-time simulation to model the spread of a virus in a modern environment. This is done through the use of various real-time path finding algorithms, such as A* and potential fields.

Keywords:real-time simulation, virus spread, potential field

1 Introduction

The goal of this project is to explore the development of a real-time situation of the spreading of a virus in a modern-day environment, such as the TJ building. This project will also explore various pathing AIs and their applications to a real-time situation such as people moving through a building. The final goal of this project is to explore the results of the simulation and the effects of various building changes on the spread of a virus.

2 Background

For this project, I will need an extensive knowledge of Java, Java2D and Python. These languages are going to be used for the base system, display, and pathing AI, respectively. I will also need to do extensive research on various pathing AIs and their possible applications to a real-time situation. The research of pathing AIs is important to this project because having a good pathing AI aids in increasing the speed of the simulation, thus allowing it to be "real-time". Some possible pathing AIs include an A* variant, a variant on a traditional RTS (real-time strategy game) potential field AI. This most promising seems to be the potential field AI, because it is generally fast and accurate when finding a path to a target location.

I will also need to research information regarding the spread of a virus. The basic idea behind the spread of a virus is to have an airborne virus where the chance of in-

fection increases with distance. This simple formula for virus spreading is effective and easy to implement. Other variables could be included into the simulation if I find any in further research.

3 The Problem

The main language for this project will be Java. I will use Java for the main control of the project, meaning the main map system and the control for the Java implementation of Python, Jython. I will also be using Java2D, a 2D graphics library, to design the user interface and display of the simulation. I will also use Python, which is in the form of Jython, to design the pathing AI needed for the project. I choose to use Python for ease of use.

3.1 Simulation

The project is going to be a real-time simulation, where virtual people are going to be walking through hallways in a building. The buildings will be modeled after actual buildings such as the TJ building. As the people walk through the building, there will be a virus, starting in one or more people, spreading between the people. The closer an uninfected person is to an infected person, the higher chance the uninfected person has of being infected by the virus. The end result of the simulation will show the various concentations of infection events in the different parts of the building.

4 Conclusion

The end result of this project will be a actual real-time simulation, where people are making human-like movements through a modern envrionment. As for simulation results, I expect to come up with results showing that there is a corelation between varios aspects of a building and concentrations of virus infection events. I also hope that my research and creation of a simulation modeling the spread of a virus in a building could aid in the construction of new buildings to reduce the chances of getting a virus while walking through hallways. One application would be to aid in the design of the new TJ building, the hallways of which could be designed with my results in mind to help reduce the chances of getting a virus or disease during the school day.

References

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