Traffic Dynamics of Scholastic Environments

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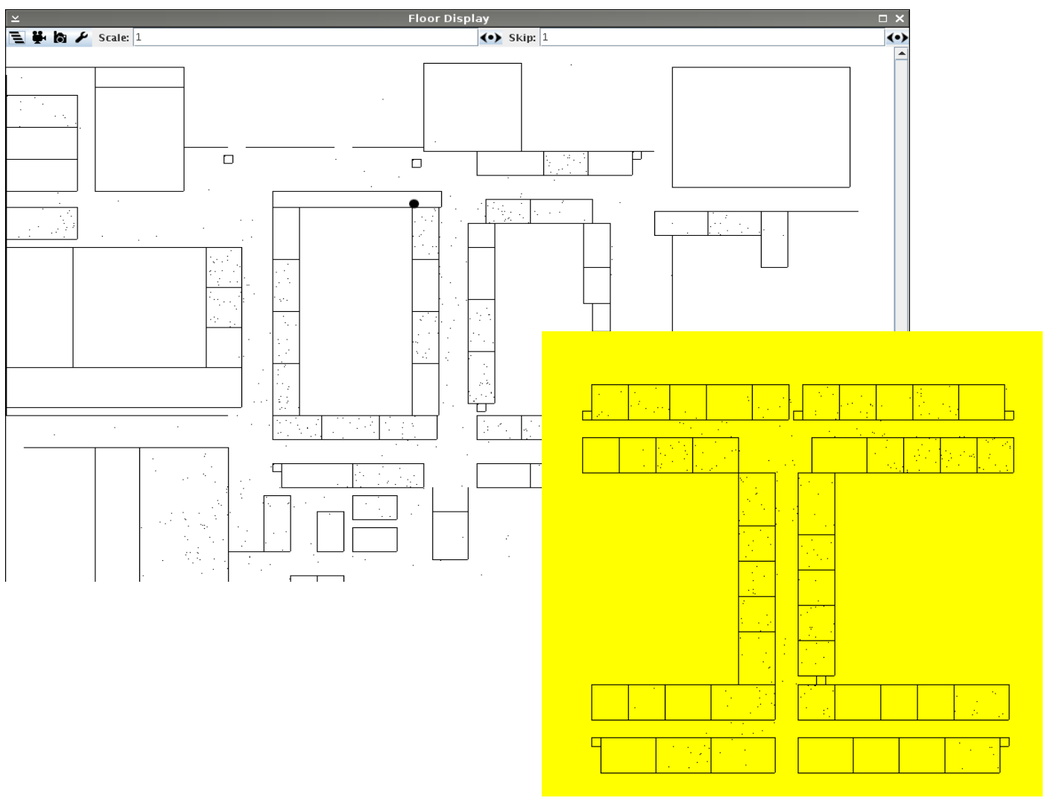
Abstract

The purpose of this project is to create a simulation of the students and teachers at Jefferson moving around the building. This simulation is meant to be accurate based on time and location. The program is coded in Java, using MASON, which provides the appropriate graphic output interface. The simulation allows the user to play, pause, start it over, or initiate a fire drill. The user is also allowed control over the length of class, breaks, and lunch.

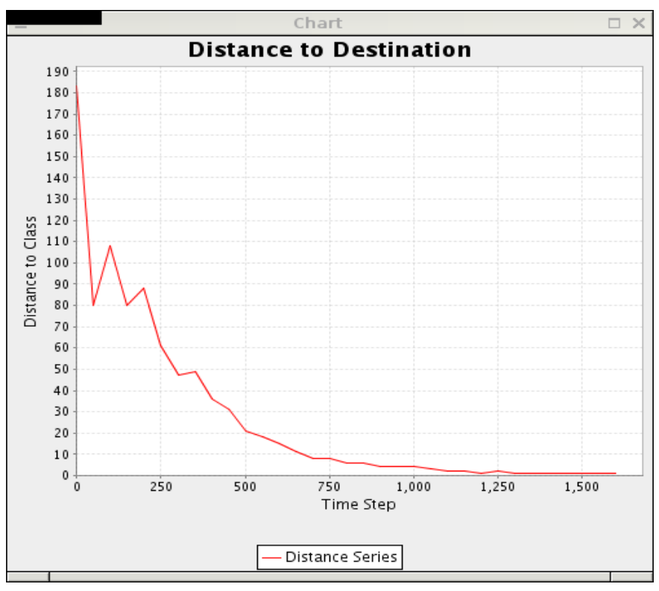


Background/Introduction

The idea behind modeling is to create computational devices and then simulate them to model real phenomena. One of the first such simulations was John Conway's Game of Life. Research has been done on this topic before, but so far no one has done a simulation of a school. One of the projects I looked at instead was a traffic jam simulation in a city. The project made some discoveries about human behavior. Humans tend to optimize their behavior by avoiding collisions with obstacles and with other humans. The humans in my program will avoid obstacles and will be able to keep themselves away from danger.

Procedures and Methods

I used MASON, a MultiAgent toolkit from GMU, which had GUI capabilities to construct a simulation of TJ students moving through the school. The program initially reads in the locations of walls and rooms and displays them to the screen. There are also additional special rooms that are needed to take care of the fire drill procedure. The student dots are capable of starting in one of five locations that reflect the areas students generally come from at the start of the school day. The students follow real schedules, which are also read in from an input file, as they go through their day. Students may get to class early, on time, or late. In theory, no student should be late unless he is an extremely slow walker or his next class happens to be located far away. Each student has a randomly generated step size to account for different real gaits. The user has the option of pressing the fire drill button, which will activate the fire drill procedure and students will move to their assigned locations for a fire drill.



This is a graph of student destinations versus time the simulation is running. As can be seen, the students get closer and closer to class as time goes on.

Results and Conclusions

The result is that over the duration of the simulation, a typical anchor day, the dots behave according to specified formulas, which are mainly probabilities and defined schedules. From this, one is able access an eagle's eye view of the school during the day. This may be of help to students if they want to know which hallways are generally less crowded than others. Administrators may be interested to see the efficiency of the fire drill.