TJHSST Senior Research Project
Project Proposal
TJ Hall Modeling
2006-2007

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November 2, 2006

1 Abstract

The purpose of this project is to model TJ students in their native environment throughout a typical school day. The goal is to have dots to represent the students moving on the basis of probability to various parts of the building. If the project were completed it would allow the user to control various aspects of the day. This project is worth doing to demonstrate just how big the need is for a new building; to indirectly show that TJ is overcrowded. Students and teachers alike might be interested in seeing the results, mostly to avoid the crowded areas during their travels.

2 Introduction

2.1 Scope of Study

Because of time constraints for project development, the program is not expected to provide any major insights into the movements of students and teachers, only to model their location changes and reflect the places in the building where people tend to congregate at specific times during the day.

2.2 Expected Results

The results should consist of three windows, two that show the floors of the school and one that functions as the control panel and allows user manipulation of variables. The students and teachers are represented graphically as dots that behave according to specific formulas.

With my project this year, I want to learn about the behavioral patterns of humans when it comes to travel around a building. The real reason for doing this project is because it

would be amusing to watch dots moving around an almost scale model of TJ. This would fall under the category of gathering evidence, in particular evidence about how well models simulate human behavior.

3 Background

The idea behing modeling is to create computational devices and them simulate them to model real phenomena. This area of development started out with the idea of the Von Neumann machine, which is a theoretical creation that would be fitted with instructions of the creation of another machine just like it. It was never actually built, but it led to John Conway's Game of Life, which consists of a grid of cells that "live" or "die" based on their neighbors.

A great deal of research has been done on agent-based modeling before. A famous project in this area is Sugarscape, which is a simulation of agents moving around piles of sugar. The agents have the ability to consume the sugar and metabolize it as they move around. If they have enough energy, they are capable of reproduction. Another of the examples I looked at 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. This is something that I hope my program will also be able to demonstrate.

4 Procedures and Methodology

Nothing extraneous will be needed for this project, students surveys may be appropriate later on to determine validity. I will be using MASON, which is written in Java, and provides the classes necessary to construct simulations. For the first three quarters, I plan to work on the programming aspect of the project, and the for the last quarter I plan to work on the testing part.

The visuals that I can construct include charts that graph the time passed with the probablities of being in a certain location, such as the T, senior lounge, and junior lounge.

I will be using Process modeling to determine how well the program models the existing student behavior. Right now I'm thinking that student surveys could be used to find out whether, based on their experiences, my model represents an accurate day at TJ.

5 Testing and Analysis

To test my program for correctness I will rely upon the opinions of my classmates. To fix parts that aren't working would require me to comment out irrelevant sections of code and work with the problem area separately. Input to the program will remain constant for now; the data to model the walls of the school and the students is read in from a data file. Initially, I will assign arbitrary probabilites to students' locations and then will tweak them

to resemble what can be witnessed in real life. I am not sure that it will be possible to define specific mathematical formulas for this project.

5.1 Expected Results

The results that I expect to obtain will serve the common students in identifying problematic areas in TJ hallways and will allow him or her to avoid them in the quest to get to class on time. The final results and analyses will be presented by a demonstration and the results of a series of runs with various user controlled variables. If the project were completed, I imagine it would perform well and be quite entertaining to watch.