Simulating Traffic Congestion on Route 1

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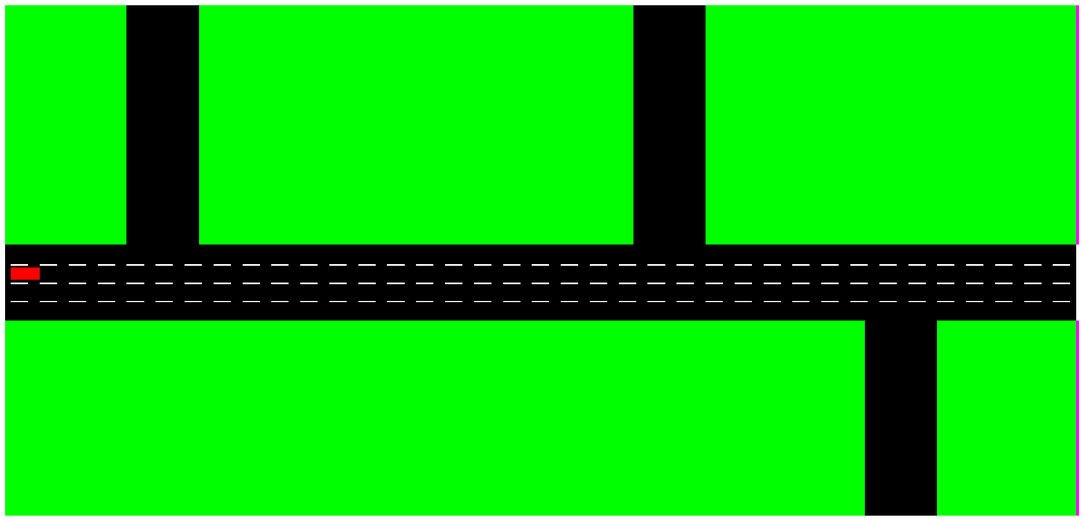
Introduction

Currently, Route 1 has trouble with traffic congestion during rush hours, when many people use it to commute to their workplaces. I will create an accurate model of the traffic congestion on Route 1, by creating a multi-agent system. In addition, the system will be based on traffic count data from the Virginia Department of Transportation from 2008. The data and simulation will be used to find the cost to each driver on the current system using a variety of factors such as: average speed, cost of gas, and travel time. Similar projects have been completed at TJHSST in the previous year, as well as around the world , as the traffic congestion problem is one that affects everyone around the world.



Background

Currently, Route 1 has trouble with traffic congestion during rush hours,when many people use it to commute to their workplaces. There are many articles on traffic congestion and traffic management solutions. One article had many factors with which to determine the cost to each driver of each traffic management decision. I hope to incorporate some of these factors into my calculations. Two other articles dealt directly with urban traffic easement simulations, one entitled "City Traffic Simulation and its Utilization" and another entitled "A multiagent urban traffic simulation Part 1: dealing with the ordinary". These two projects are very similar to my own and allowed me to look into the conclusions of my fellow researchers. Both offered solutions such as specific-use lanes and increased driver knowledge as ways to ease congestion on urban streets. Common solutions to alleviating traffic congestion are naked intersections, round-a-bouts, additional lanes, and lanes for public transportation only.

Procedure

The first piece of the project I am working on is the graphics part. This includes creating the road system to an accurate scale, creating the cars, and having them behave as actual cars. The road system will be a multi-agent system where the cars are the agents. This allows for the cars to interact with each other while still maintaining their own goals. In this way the cars will act as real cars because they will make decisions based on their own goals first, then they will consider the goals of the system as a whole. The cars interact through the use of a matrix that creates a grid system over the image, where each agent occupies a single space in the matrix. Therefore the cars are able to determine when it is clear to change lanes and what the appropriate speed to travel at is. In addition the cars can look ahead and to the sides of them similar to a human driver, determining the holes in traffic that allow them to accomplish their travel goals.

Results

The cars drive down a two-way, multi-lane road, following their own route in order to reach their destination, interacting with the other cars on their side of the road in order to create a normal, efficient and safe driving environment. The cars are able to turn right freely and turn left when they have the light. The traffic lights are timed to give a realistic amount of time for the cars to flow freely. Finally, the VDOT data has been used to accurately introduce cars into the network system. A pattern has developed in the traffic development as time goes on the congestion on the road increases. For example take two cars one travels on the road 10 secs after the next, the second car will always have a higher cost per driver than the first car.