

Project Proposal 1st Quarter 2008

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Computer Systems Project Proposal - October 2008

1. The Tragedy of the Commons as Applied to a Traffic Simulation

2. Purpose and scope of the research project

* To create a simulation of basic traffic routing and congestion, and to create different algorithms for path finding - individuals acting in their own best interest, acting with courtesy, and following a global system optimized for different variables (total travel time, average congestion, etc).

3. Background and review of current literature/research in this area.

A cooperative multi-agent system simulation model for urban traffic intelligent control.

<http://portal.acm.org/citation.cfm?id=1357910.1358059&coll=Portal&dl=ACM&CFID=3792220&CFTOKEN=79083176>

This report talks about the practicality of different systems being used to control urban traffic flows and structure. It talks about the traditional setup, with users making all the choices, and two different systems involving different amounts of computer control, similar to how I plan to use different algorithms to choose routes.

The Tragedy of the Commons

<http://dieoff.org/page95.htm>

This classic earth science theory is about the behavior of individuals in certain situations. It postulates that people will always act in their own self interest, even when it is to the detriment of the society as a whole. It also says that there is no way to prevent this. I disagree with this, however. If we have an omniscient controlling intelligence, we can avoid this, and that is what I am trying to demonstrate.

Microsimulation of Road Traffic

<http://vwisb7.vkw.tu-dresden.de/~treiber/MicroApplet/>

This program is a traffic simulation also, however, rather than focusing on route dynamics as I am, it concentrates on interactions between individual cars.

4. Procedure and Methodology.

* I will use Java to develop the simulation. I may or may not implement some parallel processing to improve calculation time.

* I can test using the UI to create different situations and seeing if the different path finding algorithms work - ex: in the one that is supposed to model humans individually choosing a route will reflect real world traffic situations, while my "improved" computer generated route for cars will show an increase and decrease in various traffic stats such as congestion and route times.

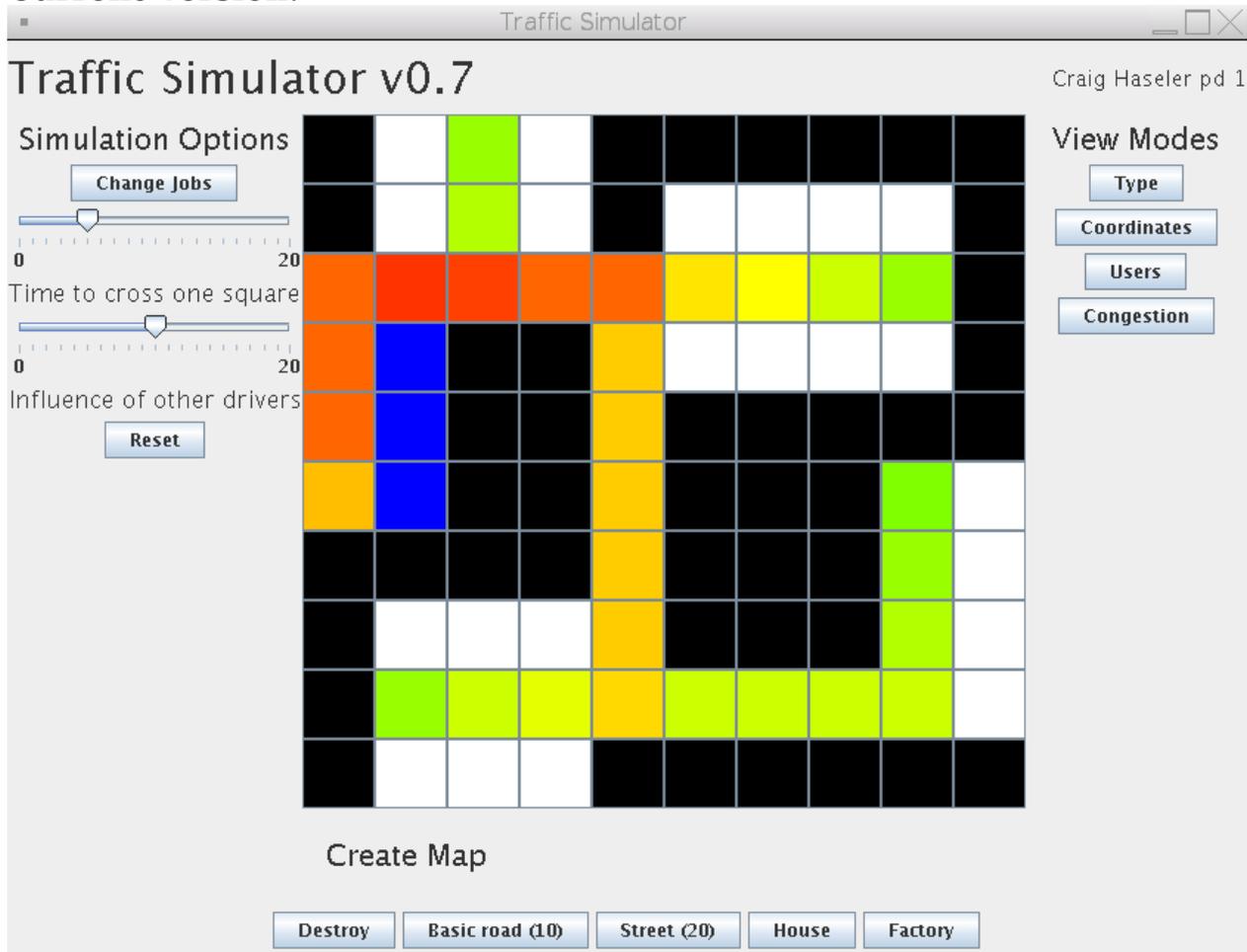
* There are different viewing modes available, and between the different modes it should be possible to get an accurate estimate as to whether the program is working correctly. To measure the effectiveness of the algorithms, I simply have to compare the results given to me in the statistics pane.

5. Expected Results & Value to Others

* This project could demonstrate the effectiveness of a traffic solution in which a central computer makes decisions rather than individual drivers. While that kind of system is not currently feasible, it will not be long before we will have the technology to implement it on highways at least. In most respects, it will be a simple matter of connecting the cruise control system of cars to a central highway computer bank. Of course, there would be the hurdles of justifying this much control to a computer (and of course the risks), but this

project should demonstrate that turning over control to a computer can have significant benefits to society as a whole, even if it causes individuals to make a slight sacrifice.

Current Version:



This is a screenshot of the current implementation of the congestion view. Note the different colors, show the congestion on a scale of green-yellow-orange-red. The sliders on the left allow the changing of variables, and the buttons on the right allow for changed views. The buttons along the bottom allow the user to create new road patterns, and watch how the traffic adapts.