Name(s)	Project Number
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Project Title

A Computer Traffic Simulation: Vehicle Throughput across a Grid of Intersections Varying Driver and Car Parameters

Abstract

Objectives/Goals
This computer simulation was created to produce a more accurate model of traffic, taking into account realistic driver behaviors.

Methods/Materials
The simulation was written on a computer in C# and developed in Visual Studio 2017. The code was stored in a git repository and the changes were logged and managed with GitHub.
The simulation was analyzed by how many cars passed through the test environment as compared to the number of car crashes across hundreds of trials with varied car and environmental parameters. The cars' parameters included an acceleration and deceleration constant, a maximum speed, and a target headway. Each intersection is assigned light timing at the beginning of each trial.

Results
The trials were able to approach high car survival rates, in some cases almost 90%, as the algorithm was improved over time. The throughput percentage for the simulation varied slightly in each trial, as the parameters of each car and intersection were randomized to help increase realism.

Conclusions/Discussion
The simulated cars were able to replicate some behaviors seen in real cars with real drivers. According to the research, drivers on a road without a bottleneck exhibit three behaviors: a period of acceleration, a period of stability, and a period in which the cars slow down in a jam. In the simulation, these behaviors also exist in a very visible form.

Summary Statement

This computer simulation of traffic modeled cars as independent units, each implementing a basic algorithm based on internal and environmental factors, to achieve somewhat realistic behaviors to eventually predict routes and flow.

Help Received

I wrote and executed the simulation and the data analyzer by myself. Stan Khaykin taught me the concept of linked lists.