Traffic Simulation

Alternative Project Spring 2020 INFO 6205

The goal of this project is to simulate the flow of vehicular traffic by considering how vehicles avoid each other.

Imagine an infinitely long highway with no intersections. Vehicles are in steady flow although at random positions (we assume that the density is less than the capacity).

Now, consider the situation where a lane is dropped: perhaps four lanes to three or three lanes to two. These are very real situations here in the Boston area. You can easily see this places by looking at traffic densities reported by Google maps, etc. Two examples are I-90, Westbound in Natick and I-93 Northboard at Dascomb Road in Andover [it might be impossible to see these effects during COVID-19]

What happens? Two lanes are forced to merge. In practice that lane will merge with its neighbor and so on. In order to negotiate such a situation, traffic must slow down. A lot.

In order to simulate the traffic, I recommend maintaining a priority queue similar to the one in the elastic collisions described in the priority queue module. Potential collisions that happen soon will be at the top of the priority queue. When such potential collisions are avoided, they may set up other potential collisions.

Some sort of graphical representation of the simulation is required of course, but not anything very sophisticated.

The most important part of the project will be the report which describes what was done, and any conclusions which could be drawn.

Factors to take into account are:

- The stopping distance for a vehicle traveling at a particular speed (for simplicity, we assume all vehicles are of the same type)—i.e. a function;
- The width of a vehicle (as a factor of lane width);
- The density of traffic (number of vehicles passing a point per minute);

Factors which we assume are constants:

- Road condition (dry);
- Distance to previous and next interchange (infinite);
- Lane width;
- The speed limit.

Other flow interruptors which you might consider include:

- Police vehicle;

- Crash.

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