

Traffic

Having recently moved to Los Angeles I am interested in the infernal system underlying the flow of traffic. There must be systematic rules which govern the behavior of vehicles on the road, but the results are often unpredictable.

I imagine a simple model of traffic could look something like this:

There are a given number of vehicles on the road. This would probably be an externally determined parameter, or would ebb and flow according to a simple periodic function.

Each vehicle has a destination. Each vehicle knows several possible paths to that destination. One is the highway route, which is the shortest path, and which everyone knows about. The other paths take side streets. This path is longer, but since there are more options there are fewer vehicles.

The script might look something like this:

Define the roadmap:

Create a set of points which are the possible sources and destinations of vehicles.

Draw straight lines between those points. These are the "freeways."

Draw spheres whose diameters are the segments of freeway. Extract several half-circumferences of the sphere as "side streets."

Create traffic:

Each vehicle looks at the number of cars on the highway, and makes a decision about which route to take.

Each vehicle is a sphere. A single vehicle will choose a path and move toward its destination at the "speed limit" or its individual "speed preference."

Traffic jams: If a fast moving vehicle catches up to another vehicle, the two become a single sphere (with twice the volume) and move at the speed of the slowest member of the group.

As more vehicles catch up to the group the blob grows.

Fast vehicles can "escape" out of the front of the blob, but at a limited rate.

Once vehicles reach their destinations they either exit the model or head off to a new destination.

This model could be more 3-dimensional than the real transportation network.

It would probably use a lot of random variables to make decisions about route and speed. Perhaps there is a better way

And, ideally, if the traffic jams would become articulated blobby masses instead of simply spheres.