

Research Question

The traffic simulation is a helpful tool in terms of helping researchers clarifying the interaction among different vehicles, particularly in urban area. Multiple influential factors are involved in the real world, so we shall simplify the simulation in order to obtain an understandable result. Among all the variables, the behavior of drivers is usually the key, which makes the simulation more interesting as well as introduces effect that is more significant. Thus, the interest of this research project will be focusing on the emergent behaviors of the citizens driving their cars. In other words, where does the traffic jam usually take place, when does it happen, how are different driving behaviors impact each other's and the subsequently the traffic flow? These are the important points that we will be simulating and analyzing in the simulation.

State of the Art

Models that are popular include to-follow models. Models such as the cellular automata model designed by Nagel and Schreckenberg treats the vehicles as individual agents with a set of given rules, also exhibit the complex phenomena associated with real traffic [1][2]. The interactions are largely governed by car-following and lane-changing logic [3][4][5]. One well-known model, among various vehicle following models, which attempt to describe vehicle following based on anti-collision concept is the "Gipps model", developed in 1981 [5][6]. In this model a vehicle always aims to be able to stop safely if the vehicle it is following performs an emergency stop [6]. Another class of models, known as the "Psycho-physical" vehicle models attempt to capture both the physical and human components of vehicle control. They do this by maintaining a vehicle state, where the current state is determined through the differences in speed and distance to the leading vehicle [4].

Methodology

The simulation is of the traffic of a typical working day in an urban environment with the time and space scaled to shrink the real situation. The simulation environment is a closed world with places for entertainment, offices, schools and homes.

The environment is modeled using nodes for junctions and the pathways as links, in which some pathways have more than two lanes to allow overtaking behavior. We generate the environment randomly in a predefined space. The whole map is considered as a grid and is represented by a two by two matrix.

Each individual (agents) will have their goals designed to imitate a regular life of a person. There will be different personalities such as aggressive, defensive, speedy, and drunk. As the words suggest, the behavior of the drivers are exhibited through their driving style and how they react to particular scenarios. For example, a drunk driver will drive without following any of the road rules and the aggressive driver will try to overtake other cars and advance aggressively.

References

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Timeline

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