

Motivation

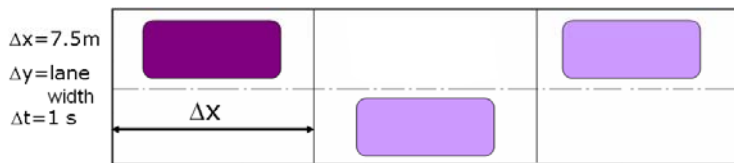
In some developing countries, motorbikes have a large share of the traffic composition (more than 70% in Vietnam, Thailand, etc...) and the lane-based rule is not strictly complied. Motorbikes can travel with more freedom but their behaviours are significantly affected by surrounding vehicles due to their safety concerns. The considerable differences in using road space of non lane-based traffic make it difficult to evaluate and manage this traffic condition because their road system is designed based on standard code of developed countries.

While most available models are developed for lane-based traffic, this research aims to simulate non-lane based mixed traffic conditions at a network scale; in order to have a tool to evaluate ITS measures in motorbike dominated traffic streams as found in Vietnam, Thailand...

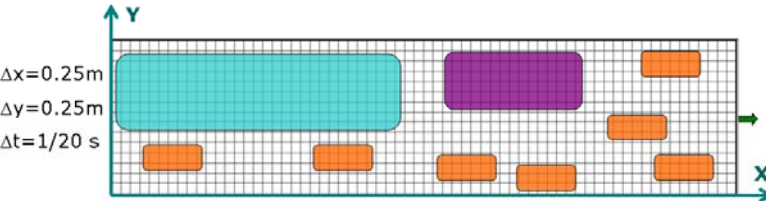
Model

A cellular automata (CA) model is developed for 3 vehicle classes: motorbike, car and bus in an intersection approach.

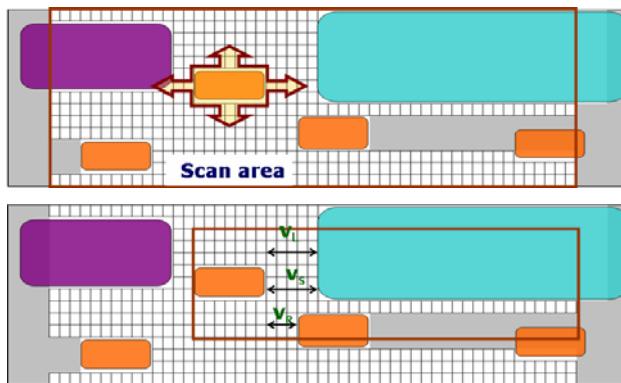
CA model for Lane-based traffic



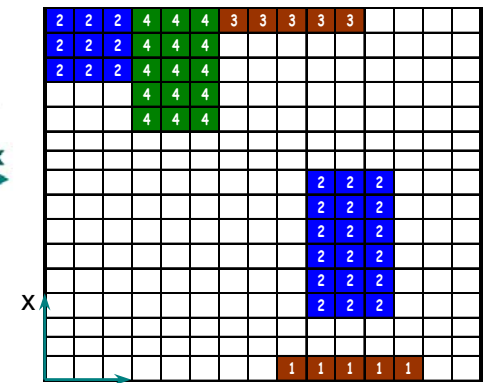
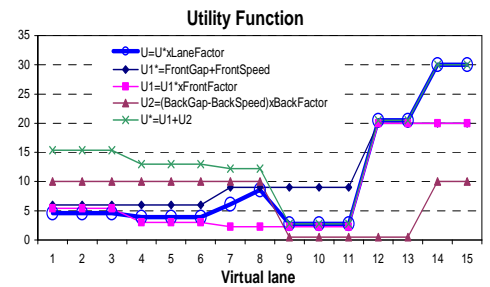
Modified CA model for Mixed traffic



In one time step, the driver scans surrounding area to have information of current driving environment; and checks safety speed to avoid collision.



Legend: unknown (grey), empty (white), bus (cyan), car (purple), motorbike (orange)



The driver chooses his direction depending on Utility function which shows the variation of the gain at each "virtual lane" in a certain time.

The Utility function takes the possible reasons for changing direction as its parameters into account. They represent the effects of surrounding vehicles: type, speed and gap distance as well as the lane using behavior of drivers. The current prototype for an intersection approach performs well. The formation and dispersion of queuing behavior in non lane-based traffic condition is represented realistically.

In the next steps, we will model several intersection types to achieve a network scale model and calibrate the model with video footage from Hanoi, Vietnam.

Contact