Traffic dynamics
Multi-area, multi-lane, multi-class

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20-10-16
Background

- Physicist (MSc), interest in flows
- PhD in traffic dynamics (effect of incidents)
- International work:
  - Flows are wider applicable: use methods from other disciplines
Traffic dynamics
Traffic dynamics

- Traffic flow theory
  - Multi lane
  - Multi-class: cars/bikes
- Multi-area: Network dynamics
Multi-area traffic research
Traffic flow description per zone

Traffic can be modelled on the level of:

cars

roads,

and now: zones!
Large scale description
Dynamics rules:

- Estimate bin dynamics from speeds and capacities
- Correct for traffic lights and non homogeneity
- Also adjust boundary capacity (from road caps)
Multi-lane traffic research
Observing driver behaviour

Difficulties in observing cases where LC is not made

Observing driver behaviour

Traffic dynamics
Multi-lane research

• Everyone considers himself a “normal” driver
• Mayor differences!
• 4 main strategies:
  Speed leading
  Speed leading with overtaking
  Lane leading
  Traffic leading
• Others?

=> Simulate effect on flow
Multi-modal traffic research
Effect of pedestrian crossings

• Known: capacity of the road under one single (fixed timing) pedestrian crossing => which time the flow is blocked?
• Non controlled: analytically solvable
• Spreading pedestrian load over more pedestrian crossings benefits drivers and pedestrians
Vehicular capacity of pedcrossings

- More crossings help
- No interaction effects taken into account
Introducing pedestrians

- Theory: capacity cannot depend on shape of triangular fundamental diagram
- Dimensional analysis: $\text{cap}(v_H^*p*t^2)$
- Simulation (circular road)
- Theoretical bounds
Road capacity with pedestrians

Capacities with bounds

\[ \text{theta} = \sqrt{2} \sqrt{\text{pedestrian flow p*vHM*tcross}^2} \]
Future works

• Include cyclists (and other modes) in the road-based and area-based descriptions
• Include the effect of traffic control
  – traffic lights?
  – Demands?
• All other flow problems...