Optimizing the city for the people: understanding the issues of flow

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“Some 3.8 million premature deaths annually are attributed to outdoor (ambient) air pollution. About 80% of those deaths are due to heart disease and stroke, while another 20% are from respiratory illnesses and cancers related to exposure to fine particulate matter (PM2.5), the most health-harmful air pollutant.”

- World Health Organization

How can we solve this?
• 4,9 millions vehicle trips inside downtown Barcelona

• Traffic is unevenly distributed: same capacity for many streets, although not optimized
Bus orthogonal lines

- Bus lines have been optimized to reduce exchange time and total trip time
  - Consequence: heavy traffic goes to main avenues and small streets become uncongested

Can we do the same with people and small vehicles?
Current traffic situation:  

*Not optimal*

**Problem:**
- Bottlenecks
- High waiting times

**Consequences:**
- Air and noise pollution
- Pedestrian-unfriendly (hard to cross the street)
Question 1: How to identify current issues?

Example: Gran Vía con Llacuna

People flow

Traffic flow

Using existing infrastructure:

Picture references: https://diamondtraffic.com/, elperiodico.es
Question 2: how can we improve flow?

Goal: Optimize people and traffic flow simultaneously

“Green wave for the people”

Reference: https://en.wikipedia.org/wiki/Green_wave
Our proposal: adaptive flow system

Current situation

Optimized situation

Deep Q-learning system
Our proposal: adaptive flow system

Current situation

Optimized situation

Deep Q-learning system
Sneak peek on the technique

Temporary super - blocks

- **Optimized traffic is condensed into the perimeter of super-blocks**
  - **Benefit:** inside of the super-block is more peaceful for the people → oasis for the people
- **Administrative decisions:**
  - If we want to improve air quality, we can switch the temporary blocks as needed → better oxygenation
Key system features

- **Scalable**: optimization up to N intersections (pedestrian + vehicles) → any city of the world

- **Versatile**: customize the system so it prioritizes people over traffic

- **Real time acquisition**: how do flows move?

- **Easy to implement**:
  - data gathering with existing infrastructure
  - affordable real time computation: adaptive system
Thank you

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