Artificial Intelligence for sustainable mobility

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Sustainability is based on three pillars

Andrew, Sunray, based on “Sustainable development”; by Johann Dréo / CC BY-SA
Sustainability and Mobility

- Road traffic deaths 1.35 M per year globally, 10 M injured
  - 93% of accidents caused by a driver error
- 1st leading cause of death for 5-29 year olds
- Greenhouse gas emissions
- Equal opportunities for transport

WHO Global Status Report on Road Safety, report 2018

Box 3: Sustainable Development Goals for Road Safety (September 2015)

- Hindi and well-being: By 2020, to halve the number of global deaths and injuries from road traffic crashes.
- Sustainable cities and communities: By 2030, to provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities, and older persons.
AI for Sustainability – Smart Mobility

- Artificial intelligence makes it possible to revolutionize mobility
  - Optimizing routing
  - Combining different transportation modes
  - People and traffic flow, predictions
- Autonomous driving
  - Safety
  - Equality
- Lot’s of data collected
  - Availability, sharing
  - Privacy, biases
Reliable Perception and Navigation

Seamless Location Data
- Satellite navigation not enough in urban areas
- Autonomous systems use optics (computer vision)
- Pedestrians require small equipment
- Fusion of multiple data sources
- Spatiotemporal Data Analysis research group
  - 3 postdoctoral and 5 PhD researchers

AI for fusing data
Data from: Global Navigation Satellite System (GNSS), Computer Vision, 5G, Sensors
Reliable Perception and Navigation

3D Object Understanding

- What are the objects in the area and where are they wrt the observer
- Object detection, tracking, pose estimation, scene reconstruction, …
- Atypical perspectives complicate the situation even more

Leinonen M. (2021), Monocular 3D Object Detection And Tracking in Industrial Settings, MSc thesis
Sustainable urban development emerging from the merger of cutting-edge Climate, Social and Computer Sciences (CouSCOUS)

Laura Ruotsalainen (CS), Sanna Ala-Mantila (EY) & Leena Järvi (INAR)

CouSCOUS combines
- Artificial Intelligence
- Socioeconomic population forecast and environmental equity mapping
- LES based air quality model that can account in detail urban areas
to optimise air quality at street space in different planning and traffic flow scenarios

Duration
1.9.2020 – 31.8.2024
Funding ~ 990k€
AI for traffic planning

- Traffic modelling, dynamic routing
  - Traditionally done by looking at limited number of variables (season, time, events, weather, …)
  - Deep Learning for including all above mentioned variables
- Reinforcement Learning for combining air quality, socioeconomic and traffic modelling data