32nd Virtual Meeting of the International Safety Data and Analysis Group (IRTAD)
April 13th, 2020

OECD International Transport Forum

irtad International Traffic Safety Data and Analysis Group

Artificial Intelligence in Road Traffic Crash Prevention
ITF Round Table

George Yannis, NTUA
Alexandre Santacreu, ITF

Presentation Outline

1. The ITF Roundtable
2. Main Findings
3. Recommendations
4. Conclusions

The ITF Roundtable

- The 3-day online ITF roundtable on Artificial Intelligence in Road Traffic Crash Prevention wa held in mid-February 2021
  https://www.itf-oecd.org/artificial-intelligence-crash-prevention-roundtable

- A balanced group of 45 experts from 33 organizations and from 15 countries:
  - Data providers
  - Technology and Industry Groups
  - Governmental/Intergovernmental Organisations
  - Academics
  - NGOs

ITF Roundtable Objectives

➢The objectives of the RoundTable:

- Identification of the most relevant use cases for Artificial Intelligence in:
  - ✓Mapping crash prone locations along the entire road network
  - ✓Supporting a proactive approach to network safety management
- Recommendations to all relevant stakeholders to lift barriers to the development and the appropriate utilization of life-saving AI solutions

AI Road Safety Applications

➢ Road infrastructure risk prediction

AI applications can transform big data on crash occurrence and road and traffic characteristics from infrastructure sensors into multi-dimension static or dynamic maps of road risk prediction and road star rating.

➢ Vehicle technology

AI algorithms are implemented to exploit computer vision and interpret data provided by RADAR and LIDAR technologies in both traditional and Connected and Automated Vehicles.

➢ Telematics assisted driver behaviour monitoring

AI can exploit big data from vehicles and smartphones to identify risky behaviours like speeding, harsh manoeuvring and distraction and provide customized solutions, including driver behaviour star rating.

Main Findings (1/3)

- AI facilitates the proactive management of traffic safety in two ways:
  - Collection of data on road infrastructure conditions and traffic events through sensors and systems such as computer vision
  - Identification of high risk locations proactively, through predictive models
- Decision makers are more familiar with a traditional reactive approach to traffic safety which consists in the re-design of high risk locations

Main Findings (2/3)

- AI pushes the limits of pattern recognition beyond human capabilities and may thus uncover new crash-prone road configurations

- Recent developments in the field of so-called "explainable AI" begin to cope with the challenge of the "black box" phenomenon

Main Findings (3/3)

- Two main challenges need to be overcome:
  - The availability of data remains in silos instead of being shared, due to the fear of litigation for the disclosure of personal identifiable information
  - Skilled individuals to supervise the modelling process as AI brings a high potential for significant upgrade of knowledge on road risk

Recommendations (1/6)

- Develop a competitive market for the sharing and monetising of traffic and mobility data
  - Governments should provide industrial partners with incentives such as monetisation to lift the barriers to data sharing, cover some true costs and develop innovative quality data products
  - Adjustments are needed, transforming road safety data from bi-product to core business activity for producers

Recommendations (2/6)

- Do not wait for real-time data to develop risk maps
  - Develop risk prediction models that feed on aggregate instead of real-time data, and map abnormally dangerous locations on the road network
  - Rotterdam and London provide an illustration of how AI can learn and predict crash risk with aggregate input data.

Recommendations (3/6)

- Mandate the sharing of aggregate vehicle data
  - Define a minimum set of data for all vehicle manufacturers to report in an anonymous standard aggregate format
  - Collect data on traffic volume, speed distribution, and locations where vehicles' active safety systems (ABS/ESP/AEB) are engaged

Recommendations (4/6)

- Learn from other fields and best practice for data sharing and privacy protection
  - More secure alternatives to data exchange, such as the exchange of queries and responses instead of raw information
- Clarify regulatory frameworks for data protection
  - Governments should also examine how Freedom of Information laws articulate with data protection laws.

Recommendations (5/6)

- Support research and innovation efforts on the use of AI in computer vision and risk prediction
  - Priorities should include the development of so-called "explainable AI" techniques
  - Funding must also be available to road safety multi-disciplinary professionals to conduct post-intervention assessments and validate or re-calibrate the risk prediction tools

Recommendations (6/6)

- Align new tools to precise policy objectives
  - Governments should commission research to assess the capability of proxy data and risk mapping tools
- Develop new skills and a digital infrastructure
  - Promote a multi-disciplinary approach to road safety that combines expertise from the fields of data science, technology and safety
- Design user-friendly risk mapping tools
  - Estimates of the benefit/cost ratio of interventions, along with accessible user-friendly interfaces

Conclusions

- Artificial Intelligence opens a new future for road safety
- Coordinated efforts at national and international level are needed to upgrade capacity, knowledge and governance
- The Industry, the Researchers and the Public Authorities can bring highly efficient solutions for safer drivers, safer vehicles and safer roads
- Artificial Intelligence can be used as the catalyst for achieving vision zero road fatalities by 2050

32nd Virtual Meeting of the International Safety Data and Analysis Group (IRTAD)
April 13th, 2020

OECD International Transport Forum

irtad International Traffic Safety Data and Analysis Group

Artificial Intelligence in Road Traffic Crash Prevention
ITF Round Table

George Yannis, NTUA
Alexandre Santacreu, ITF