

Vorksho

Digitalisation

and Road Safety

Research

National Technical University of Athans Road Safety Observatory WWW.Nrso.ntua.gr FIFTH UNITED NATIONS GLOBAL ROAD SAFETY WEEK 6-12 May 2019



Modelling crash modification factors globally - i-safemodels –

Christina Gonidi

Transportation Engineer, Research Assistant

Together with: Anastasios Dragomanovits, Alexandra Laiou, George Yannis

The i-safemodels project

- > Project partners:
 - National Technical University of Athens, Department of Transportation Planning and Engineering <u>www.nrso.ntua.gr</u>
 - OSeven Telematics
 www.oseven.io
 - Tongji University <u>https://en.tongji.edu.cn</u>
 - Third country partners: University of Central Florida, US Purdue University, US. Loughborough University, UK German Aerospace Center, DE
- Duration of the project:
 36 months (estimated June 2019 June 2022)
- > Operational Program:

"Competitiveness, Entrepreneurship and Innovation" (EPAnEK) of the National Strategic Reference Framework (NSRF): Greece - China Joint R&D Projects



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European Union European Regional Development Fund







ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ

EPANEK 2014-2020 OPERATIONAL PROGRAMME COMPETITIVENESS•ENTREPRENEURSHIP•INNOVATION



Background

- Accident Prediction Models (APMs), including Safety Performance Functions (SPFs) and Crash Modification Factors (CMFs) are essential tools for transport decision makers, to quantitatively predict crashes, analyze injury severity, identify hotspots and assess safety countermeasures
- Developing APMs requires a tremendous effort of data collection and analysis, which could be potentially skipped if the models are transferable to conditions different from the ones they were developed for
- Thus, there is imperative need for international scientific cooperation to fully understand crash risk factors and respective measures





Research Questions

> Objective:

Propose international comparative analyses of road traffic safety statistics and safety modeling at both macroscopic (e.g. country, region) and microscopic level (roadway locations)

Research Questions:

- Which are the factors that mostly influence crash frequency and severity at both microscopic and macroscopic level, and how can this influence be modelled?
- How can hazardous locations be best identified and appropriate countermeasures selected?
- Can accident prediction models be effectively transferred to conditions different from the ones they were developed for (e.g. in other countries)?







Methodological Challenges

- > International literature reviews on:
 - risk factors and safety countermeasures (WP1)
 - macroscopic road safety modelling (WP2)
 - microscopic road safety modelling (WP3)
 - identification & treatment of hazardous locations (WP4)
 - safety prediction models transferability (WP5)
- Data collection in five countries Greece, China, UK, Germany and the US
- Model development
 - macroscopic (aggregate data, e.g. at country level)
 - microscopic (roadway geometry and traffic data)
 - hazardous locations identification

Advanced statistical techniques

besides traditional regression models, such as:

- propensity score matching,
- cusp catastrophe model, etc.



Online data platform

- > Online data platform will be established
- Freely available to researchers, scholars, policy makers and authorities worldwide
- Knowledge section Compendium of existing knowledge, based on the literature reviews
- Data section
 - macroscopic data
 - microscopic data
- Results section Macroscopic & microscopic models, transferability tests





Model development

Macroscopic models

Analyze crashes at aggregate spatial levels (e.g. country, region, census block) with demographic, socio-economic, built environment, traffic attributes and roadway characteristics

Microscopic models

- Identify relation between road crashes and injuries, and road infrastructure characteristics and traffic
- Data availability issues to be addressed

Hazardous locations

Methods for identification and methods for selection of treatments

Transferability assessment

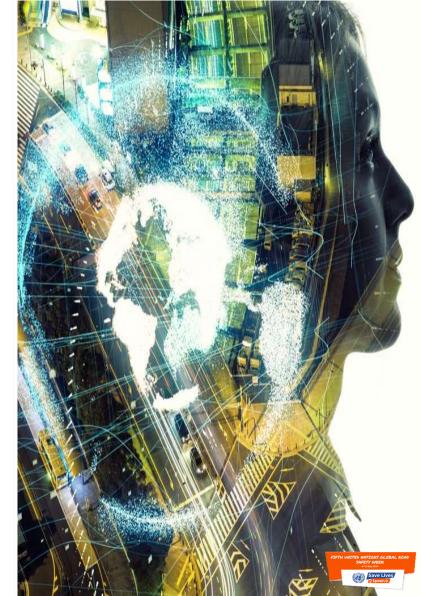
Comparative assessment of prediction performance of transferred models vs. locally developed models



Scientific and Social Impact

- Consideration of road safety on a global level
 - Address knowledge gaps in the generalization of road safety research results
- Improvement of decision making practices
 - Development of models to be used as quantitative tools in decision making
 - More effective exploitation of available funds for road safety, e.g. selection of more promising countermeasures
- Road casualties reduction
 - Improved road infrastructure safety management





Future Challenges

- Integration of a multitude of accident prediction modelling techniques, ultimately leading to advanced road safety modelling on a global level
- Road Authorities and Operators internationally should be encouraged to use Accident Prediction Models as a decision making tool.
- Evidence-based probability of being involved in a crash can be used for personalized vehicle insurance pricing policies





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