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
    www.nrso.ntua.gr
  - OSeven Telematics
    www.oseven.io
  - Tongji University
    https://en.tongji.edu.cn
  - 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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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 (roadway locations) level.

- **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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