Round Table
Use of technology and its impact on road safety
New York, June 14, 2016

Star rating driver safety behavior by the use of smart technologies

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Driver safety behaviour monitoring in the digital era

Current technological advances make data collection and exploitation substantially easier and more accurate than before due to:

- wide penetration of smartphones
- efficient transmission of large data sets (through GSM networks)
- powerful computing
- more insightful big data analysis

A new great potential arises for monitoring and star rating of driver safety behaviour, through the use of continuous data collection from the smartphone and the vehicle (On Board Diagnostics)
Continuous driving data collection

Smartphones
- the different sensors (GPS, gyroscope, accelerometer, compass, etc.) are exploited
- machine learning algorithms are developed to translate the data into useful metrics

Vehicle On Board Diagnostics (OBD)
- an affordable and easily installed device through an existing plug in the vehicle
- collecting very detailed information on the status of the various vehicle subsystems

Data are automatically transmitted into a central database through the mobile network of a telecom provider
Safety indicators of driver travel behaviour

- Total mileage and trips driven (risk exposure)
- Type and specific segments of the road network used (risky roads)
- Time of the day driving (risky hours)
- Hours driving (fatigue)
- Vehicle maintenance and safety performance (risky vehicles) (on-board diagnostics)

Driver data are combined with road network information (type of road, high risk sites, speed limits, traffic volume, traffic speed) using map matching algorithms.
Safety indicators of driving behaviour

- Speeding
  - driving over the speed limit
  - deviation from current average traffic speed
- Harsh braking
- Harsh acceleration
- Harsh cornering
- Distraction from mobile phone use (smartphone)
- Alcohol consumption (interlock devices)
- Seat belt use (on-board diagnostics)
Safety star rating of travel and driving behaviour

All these highly spatially and time disaggregated data collected require:

- special machine learning algorithms
- powerful cloud computing
- high end data mining techniques
- efficient big data analytics
- scientific traffic safety analysis

in order to be translated into benchmarking and star rating of driver travel and driving behavior
Driver safety star rating and feedback

Driver safety behavior star rating is:

• produced through joint:
  - sophisticated **weighting** of the travel and driving behavior indicators
  - continuous **comparison** with all driver population monitored

• translated into overall and specific **scores** (e.g. scale of 0 to 100)

• communicated to the driver through **smartphone and web applications** providing:
  - information and monitoring on individual driving behaviour & risks
  - feedback and tips on driving aspects needing improvement
  - benchmarking among peers
In Summary – Multi-purpose driving monitoring

The new applications of smartphones and other devices make gradually possible the continuous driver assessment, opening a new great potential for driver safety behaviour improvement:

• independently by the drivers in order to:
  - raise awareness and engagement on safe and environment friendly driving
  - provide feedback and support on driving performance and risks

• through customized insurance schemes by correlating travel and driving behaviour with insurance premiums:
  - pay-as-you-drive
  - pay-how-you-drive

• through the identification of safety problems of the driver population (and of the vehicle fleet) at the different road networks, allowing for the design of customized road safety policies

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Open challenges ahead

• Global penetration is easy, as no special prerequisites are needed, other than the smartphones

• Potential to extend this star rating of driver safety behavior:
  - to other road users (pedestrians, cyclists, motorcyclists, public transport passengers, bus and truck drivers)
  - for energy consumption and eco-driving monitoring

• More smart devices to use (smartwatches, smartglasses, etc.)

• Special attention is needed to rigorous scientific data processing and driver safety behavior modelling

• Personal data and privacy management issues need further attention
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