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Applications of microscopic traffic data analysis in intelligent transport systems

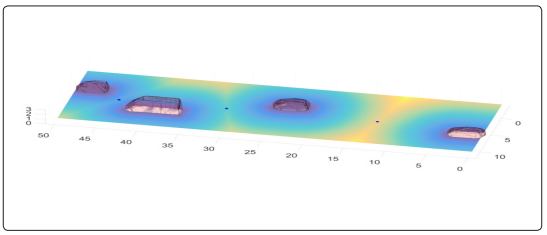

***Figure-1**: Microscopic traffic data analysis exemplified*

Recent technological improvements have led to an increase in performance and mobility of computation hardware. This development has enabled a high level of automation in traffic data acquisition and analysis. One of the most promising techniques in this field is image processing. While this technology shows huge potential due to non-intrusive and having a high spatial coverage it often leads to thorough discussions on its ethical and social implications. Especially the issue of data privacy plays an important role in this discussion as image processing easily enables the operator to misuse the raw data to other non-goal oriented purposes than traffic safety or management. In Germany, strict data protection measures restrict the use of the technology so new adapted analysis methods need to be developed and applied. In this work the ethical implications of automatic image processing are presented and discussed especially focusing different applications of Automatic Number Plate Recognition (ANPR). This method based on deep learning has drawn huge interest in the field of intelligent traffic systems, as it can easily be applied in traffic management, traffic safety and law enforcement but can also be used for mass surveillance. In contrast, a new technique is presented which consists of detecting vehicle trajectories without gathering individual and privacy prone data such as vehicle license numbers and evaluating the dense trajectory data using specific indicators depending on the current application. The data required for analysis can be gathered from different sensor techniques such as CCTV cameras, camera equipped on Unmanned Aerial Vehicles (UAVs) or thermal cameras by also using data fusion with laser scanner data. Based on different research projects, the application of this new technique is exemplified covering its use in traffic flow theory, traffic safety analysis, incident detection systems and optimization of traffic management systems.

Recent Publications

1. Adrian Fazekas, Friederike Hennecke, Eszter Kalló and Markus Oeser (2017) A novel surrogate safety indicator based on constant initial acceleration and reaction time assumption. *Journal of Advanced Transportation*; Article ID: 8376572: 9.
2. Michael Herty, Adrian Fazekas, Giuseppe Visconti (2017) A two-dimensional data-driven model for traffic flow on highways. *Networks and Heterogeneous Media- American Institute of Mathematics*; arXiv:1706.07965 [physics.soc-ph]

Biography

Adrian Fazekas is a PhD candidate at the Institute of Highway Engineering. He has completed his Diploma in Technical Informatics from RWTH Aachen University with the specialization in Media Engineering. His research work involves development of video based technologies for traffic analysis and microscopic data collection. He is involved in different research projects including real time tunnel surveillance systems based on virtual reality, traffic data collection using UAVs and online traffic management.

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