

Head:	Dr. A. Kouvelas / Dr. M. Makridis
Topic:	Analyzing and predicting the impact of traffic accidents
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Registration:	www.ivt.ethz.ch/en/studies/downloads/assignments.html#registration
Description:	<p>Although undesired, traffic accidents are misfortunes that happen frequently in urban road networks, causing great loss to the economy and threatening personal safety. For example, the city of Zurich alone has recorded more than 60,000 traffic accidents since 2011, with some of them being minor accidents while others being deadlier. These accidents can negatively influence the traffic network, possibly leading to a certain degree of congestion or even temporary lane closure, which decreases the serviceability of the vicinity of the accident. The goal of this master thesis is to study the impact of traffic accidents, which mainly includes two aspects:</p> <p>First, a data analysis should be carried out to study what factors can potentially contribute to the negative influences of the accidents on the traffic condition, e.g., severity of the accident, traffic load, speed limit, daytime of the accident, etc. Some traffic parameters, such as speed and density, as well as traffic models like Macroscopic Fundamental Diagrams (MFD), may help with such analysis. Conversely, a study on the impact of traffic conditions on the severity of traffic accidents can also be an interesting option.</p> <p>Then, based on the results of the previous data analysis, a prediction algorithm can be proposed to predict the impact of future traffic accidents, so that when information about an accident is available, we can adjust the traffic models correspondingly in real-time, as many traffic control strategies are based on these traffic models such as MFDs. Here, a simple linear regression model, and some machine learning algorithms, like random forest and deep learning, can be applied. The prediction accuracy may also be compared across different models.</p>
Remarks:	Individual work recommended
Credits:	20 ECTS for master thesis (24-30 ECTS in special cases)
Recommended lectures:	101-0437-00L Traffic Engineering 103-0849-00L Multivariate Statistik und Machine Learning
Additional information:	Programming skills in Python are required Hand-on experience with ML, incl. deep learning, can be a plus Interested students may directly contact linghang.sun@ivt.baug.ethz.ch