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With additional training data and more robust simulations, the attractiveness of this system for deploying a wider range of traffic management interventions and individual driver guidance is indeed possible. doi:https://doi.org/10.1016/j.aap.2020.105460. https://www.sciencedirect.com/science/article/pii/S0001457519307377.

Brad's Notes: Not ML

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Suggestions for Future Research: The limitation of this study is that cases with very poor data quality (e.g., no data recorded in more than one stations) are deleted in data preprocessing. However, this kind of missing data accounts for a large proportion of all cases. Future work needs to propose proper methods to supplement these missing data and improve prediction performance.
doi:https://doi.org/10.1016/j.aap.2020.105520. https://www.sciencedirect.com/science/article/pii/S0001457519317713.

Brad’s Notes: Interesting for taking temporal resolution into account. Real-time applications?

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Suggestions for Future Research: None

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Suggestions for Future Research: There are several avenues for future research. The crash severity results from this study can be compared with individual models representing frequency of crashes and crash types. The insights about the effects of ATM systems on crash severities can be enhanced with data from additional deployments across different states. ATM systems are unique and these deployments are rare across the country, with limited high-quality data, which makes the current study one of the first to analyze the severity impact of ATM systems. The current study will serve as a base for future studies to draw a comparison against performance of ATM systems as more data becomes available. **Further, a comparison between econometric models and machine learning algorithms can be conducted and used to estimate models with high prediction accuracy.** Finally, the ATMs impact on freeway crash severities was examined in this research. However, future research could focus on examining similar severity impacts on freeway interchange influence areas. The speed of vehicles involved in a crash is an important factor that could influence the crash severity. However, the only speed estimates available are those provided on the police report, which are either estimated by the drivers involved or the responding officer after the crash. Given the potential inaccuracies in this data, speed estimates were not used. Future studies could collect these real-time at-fault speeds (Khattak et al., 2018a)

using connected vehicle data, which could provide useful insights into the impact of this variable on crash severity prior to involvement in a crash event.
doi:https://doi.org/10.1016/j.aap.2020.105544. https://www.sciencedirect.com/science/article/pii/S0001457519317762.

Brad's Notes: Not ML, but interesting for recommending a comparison between econometric models and ML algorithms.

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Suggestions for Future Research: There are still several improvements that can be done in the future. First, buses are one type of vehicles. It is very promising to explore the fusion with other types vehicles, such as taxis, private vehicles, trucks, etc. Second, the impact of the different variables on crash potential prediction also needs further investigation, a proper variables generation and selection process could possibly improve the performance of the model. Forth, different deep learning architectures can be explored in the future to improve the results of the current model. Finally, it would be promising to combine the results from this paper with other similar studies. For example, Wiseman and Grinberg (2016) proposed a real-time crash potential damages assessment approach for autonomous vehicles. If an autonomous vehicle can receive the crash potential prediction results through CV as suggested in our paper, the information may help it to avoid certain crashes. For the case of inevitable crash, the crash potential damages assessment can help the vehicle achieve the least damages.
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Brad's Notes: Interesting in that it looked much more deeply at the data than other studies, looking for correlations between sets of variables. I would like to know about this SHRP-2

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Brad's Notes: Not ML

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Brad's Notes: Interesting

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Brad's Notes: Not ML

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Suggestions for Future Research: This study also lays the foundation for future research in this area. In particular, spatial and temporal autocorrelation of accidents could be interesting to explore in future work. The benefits of nested spatial cross validation over repeated random k-fold cross-validation could be assessed together with an assessment of different (temporal) aggregation levels.
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Brad's Notes: Interesting for handling imbalanced data

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performance using a meta variable: In order to further investigate contributing factors to model quality, several approaches featuring a new binary meta target variable, which is derived from the confusion matrices of the existing model results, could be tested. Multiple definitions of how to derive such a metavariable are possible. Machine learning models for binary classification could again be trained to assess variable importance for this new meta model. Balanced bagging: Following the line of Wallace et al. (2011), bagging an ensemble of classifiers induced over balanced bootstrap training samples and predicting the outcome state by using a majority vote could be a valuable approach to obtain more robust results. Correlation issues: Further insights might be gained by considering collinearity in variables and (spatio-temporal) autocorrelation effects. Unobserved heterogeneity: Since it is impossible to include all the data that could potentially determine the likelihood of a traffic accident into a statistical model, future work might focus on model formulations accounting for unobserved heterogeneity (Mannering, 2018). Knowledge-extraction and expert assessment: Tools for further assessment of black-box models, including – among others – Local Interpretable Model-Agnostic Explanations [LIME, Ribeiro et al. (2016)] and Descriptive mAchine Learning EXplanations [DALEX, Biecek (2018)] could be used for an in-depth assessment of model quality. In addition, the case-specific random forests (Xu et al., 2016), which are tailored to specific points of interest in the regressor space, could be employed to specifically assess certain road sections of interest. In addition, a comparison with similar analysis conducted in other countries might provide substantial further insights into the applicability of the proposed methodology. Overall, we hope that our findings will contribute to opening up new methodological applications of statistical learning methods in the field of road safety research.
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Brad's Notes: Statistical Learning

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Suggestions for Future Research: None

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Brad's Notes: Interesting for focus on ML, not dataset

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Suggestions for Future Research: None
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Brad's Notes: Not really related to accident analysis. More theoretical. Maybe interesting.

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Suggestions for Future Research: None

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Brad's Notes: Not ML

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Suggestions for Future Research: We believe that future research should focus on the following valuable directions: 1) Limited by the level of hardware and algorithm, there is still much room for improvement in the accuracy and range of the current perception system. Therefore, as the latter segment of perception, the driving strategies of AVs need to be designed specifically based on some limitations and assumptions of perception, and hence cannot solve all problems in a generic way. 2) The current driving strategies are based on an indispensable assumption of using identical technical equipment and the same control strategy for all vehicles (Geiger et al., 2012). However, due to the inconsistency of interpretation models and preferred objectives, different AVs may have different understandings and responses to the same scenarios. When they lack necessary communication or communication channels are disturbed, their misunderstandings and misjudgments will become a new trigger to danger. Therefore, how to formulate a framework to ensure that AVs with different driving strategies still can reach consensus is an urgent issue for future researchers. 3) So far, research on risk appetite, the feature closely related to safety, is still insufficient and deserves further advancement. Especially, how should the risk appetite of different strategies be tested, evaluated, and quantified. In consideration of the long-tail problem, how to design simulation tests to reflect the risk appetite of the strategies accurately (Li et al., 2016, 2018a; Li et al., 2019a,b). 4) Future research should focus more on communication and collaboration between vehicles. For collaboration with other AVs, the unification of communication rules and protocols should be accelerated, to form a standardized and extensible inter-vehicle communication mechanism. 5) For collaboration with human-driven vehicles, we should further construct human driver models from the cognitive level rather than the behaviors itself (Efrati, 2018; Stewart, 2018; Ma et al., 2010; Schwarting et al., 2019; Li et al., 2018b; Michon, 1985). It can help massively to develop a more reasonable collaborative driving strategy and improve the probability of understanding each other correctly when AVs interact with human-driven vehicles. 6) In the next step, researchers should pay more attention to TPACC and explore the possibility of combining it with collaborative driving. It is a meaningful

work to accurately compare the individual benefits and the overall benefits through theoretical calculations or simulation tests. 7) The purpose of this paper is to draw attention of researchers towards these important directions. We expect more exciting results will be obtained soon. doi:https://doi.org/10.1016/j.aap.2020.105937. https://www.sciencedirect.com/science/article/pii/S0001457520317577.

Brad's Notes: Not ML

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