Automated Vehicle Driving Score for Selected Scenarios

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Research question :

How to create a driving score assessment using safety metrics for an automated driving system (ADS)-equipped vehicle (AV) to ensure AVs are safe to be deployed on public roads?

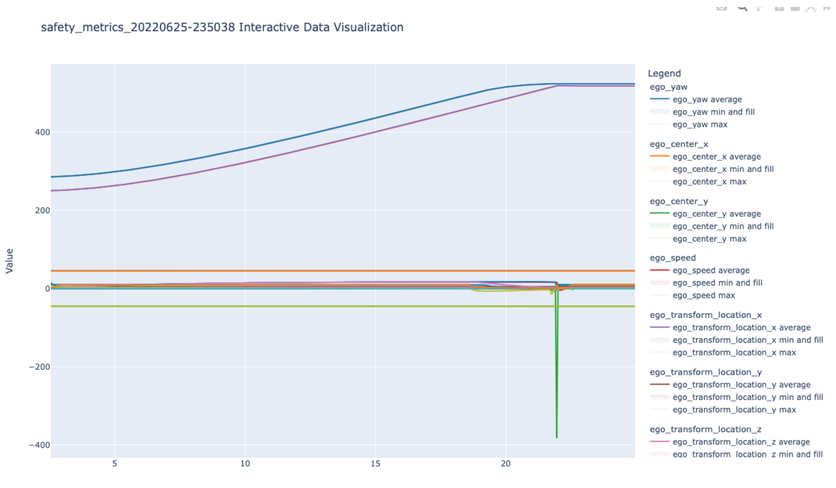
Introduction

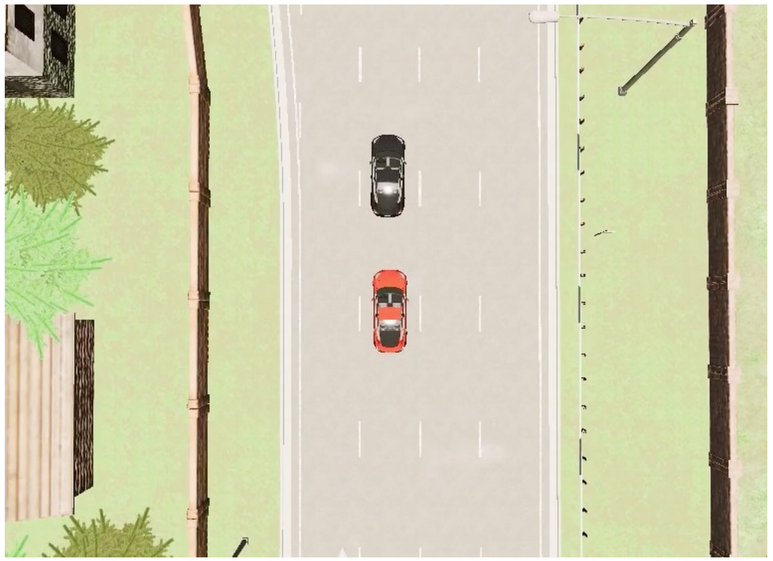
One of the biggest questions facing the safe deployment and commercialization of AVs today is “What level of driving safety performance is required compared to that of a human-driven vehicle (HDV)?” In order to answer this question, a methodology to quantitatively measure and contrast the driving safety performance of AVs and HDVs is required. Since several metrics were developed with HDVs in mind, some of these metrics are less applicable to AVs. A need exists to develop metrics as a first step towards development of the driving safety performance assessment methodology. One of the challenges facing the AV industry is the selection of scenarios to ensure that the safety metrics are broadly applicable across an AV’s operational design domain.

Methodology

The key driving safety performance metrics are determined to be most significant in facilitating the evaluation of AV driving safety performance as well as establishing metrics. The metric calculation methodology is currently being developed. The main process to complete the safety metrics is to test the scenarios for the AVs. We build different scenarios to test it on simulator and analyzed graphical data for every scenarios.

Data And Results





Conclusions and future work

As seen, the scenario testing for the AVs demonstrates the capability of calculating the proposed OSA metrics through the use of CARLA simulation and evaluates the sensitivity and interplay of these metrics for variations in initial conditions and different scenarios. The metric calculations were directly computed through the CARLA outputs to produce graphical data that could be analyzed further evaluations. With respect to the future work, there is a need for optimization of the selection process of the threshold/parameter sets of the OSA metrics. A deeper understanding of violation duration and temporal occurrence will allow for the selection process to determine the optimal threshold or parameter set. Additional scenarios will also be evaluated in future work.

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References

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