Calibration of AD/ADAS simulator: ABC method using a surrogate model

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Abstract

Recent developments in Autonomous Driving (AD) and Advanced Driver-Assistance Systems (ADAS) require an increasing number of tests to validate these new technologies. Conducting these tests on track would be too time consuming, so automotive groups rely on simulators to perform most of the testing.

To integrate simulations into the certification process, a digital twin of the physical autonomous vehicle is created and must be calibrated to generate data that is sufficiently similar to the on-track tests.

In this work, we present an efficient methodology that will assess the quality of the simulator by comparing it to real on-track data, then calibrating and readjusting it. Once calibrated, the simulator can generate more realistic time series. The process amounts to solving an inverse problem with an ABC method by integrating the use of a surrogate model that replaces the simulator, which is much faster and less expensive to run on specific tasks.

Keywords: abc method, acceptation, rejection algorithm, ad/adas, Bayesian statistics, generative surrogate model, time series prediction

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