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An Application-Driven Procedure for Optimal Signal Digitization of Automotive-Grade Ultrasonic Sensors

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Abstract : In this work, a methodology is presented for identifying the optimal digitization parameters for the analog signal of ultrasonic sensors. These digitization parameters are the resolution of the analog to digital conversion and the sampling rate. This is accomplished through the derivation of characteristic curves based on Fano inequality and the calculation of the mutual information content over a given dataset. The mutual information is calculated between the examples in the dataset and the corresponding variation in the feature that needs to be estimated. The optimal parameters are identified in a manner that ensures optimal estimation performance while preventing inefficiency in using unnecessarily powerful analog to digital converters.

Keywords : analog to digital conversion, digitization, sampling rate, ultrasonic
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