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Synthetic Driving Data Collection for Driver Behavior Analysis

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Abstract

Objective

The National Highway Traffic Safety Administration (NHTSA, 2020) reports distracted driving as the major cause of traffic crashes. To better understand the causes of the crashes and improve the road safety, researchers have started using the driver behavior data. As part of driver data collection, naturalistic driving studies (NDS) were performed which collect real-time driving data. Although NDS has numerous advantages, the collected data are prone to noise, they have data quality issues and require extensive data processing. We propose a synthetic data collection approach which has high quality data with reduced noise. The dataset contains two activity types: distracted activities, and gaze zones and each activity type has two sets: without appearance blocks and with appearance blocks such as wearing a hat or sunglasses. We hope this data will be used by researchers to train and test machine learning models and help them design and build a driver-assist system that would improve drivers' safety on the road by alerting them during driving.

Method

We designed a survey using a Qualtrics form and selected the respondents based on the criteria that created a balanced representation by gender, age, and ethnicity. We requested each selected participant to sit in the driver's seat of a stationary vehicle and asked them to follow the instructions played on a portable audio player, or we instructed them by sitting in the backseat. After a participant completed one set of activities, we requested them to repeat the set by wearing a hat or sunglasses. One set of gaze activities took approximately 5-6 minutes to complete, while the distracted driving activities took around 10 minutes. The whole set of activities took about one hour to finish.

Expected results

We performed the data reduction and annotations and ran a machine learning model. Our preliminary results show the driver looking left, right, and forward. We are extending our work to further train some machine learning models to analyze different behaviors of the driver like phone calling, eating, yawning etc.