# AUTOMATIC DANGEROUS DRIVING ANALYSIS FROM MULTIMODEL DRIVING SIGNALS

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Intelligent vehicles use advanced driver assistance systems a mitigate driving risks. This is increasing demand for an ADAS framework that can increase driving safety by detecting dangerous driving behavior from driver, vehicle, and lane attributes. However, because dangerous driving behavior in real-world driving scenarios can be caused by any or a combination of driver, vehicle, and lane attributes, the detection of dangerous driving behavior using conventional approaches that focus on only one type of attribute may not be sufficient to improve driving safety in realistic situations. To facilitate driving safety improvements, the concept of dangerous driving intensity (DDI) is introduced in this paper, and the objective of dangerous driving behavior detection is converted to DDI estimation based on the three attribute types. To this end, we propose the framework wherein fuzzy sets are optimized using particle swarm optimization for modeling driver, vehicle, and lane attributes and then used to accurately estimate the DDI. The mean opinion scores of experienced drivers are employed to label DDI for a fair comparison with a result of our framework. The experimental results demonstrate that the driver, vehicle, and lane attributes defined in paper provide useful cues for DDI analysis. The proposed framework can greatly increase driving safety in intelligent vehicles, where most of the driving risk is with the control of the driver.

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