



PBE: Driver Behavior Assessment Beyond Trajectory Profiling

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Abstract. Nowadays, the increasing car accidents ask for the better driver behavior analysis and risk assessment for travel safety, auto insurance pricing and smart city applications. Traditional approaches largely use GPS data to assess drivers. However, it is difficult to fine-grained assess the time-varying driving behaviors. In this paper, we employ the increasingly popular On-Board Diagnostic (OBD) equipment, which measures semantic-rich vehicle information, to extract detailed trajectory and behavior data for analysis. We propose PBE system, which consists of Trajectory Profiling Model (PM), Driver Behavior Model (BM) and Risk Evaluation Model (EM). PM profiles trajectories for reminding drivers of danger in real-time. The labeled trajectories can be utilized to boost the training of BM and EM for driver risk assessment when data is incomplete. BM evaluates the driving risk using fine-grained driving behaviors on a trajectory level. Its output incorporated with the time-varying pattern, is combined with the driver-level demographic information for the final driver risk assessment in EM. Meanwhile, the whole PBE system also considers the real-world cost-sensitive application scenarios. Extensive experiments on the real-world dataset demonstrate that the performance of PBE in risk assessment outperforms the traditional systems by at least 21%.

Keywords: Driver behavior analysis · On-Board Diagnostic (OBD)

1 Introduction

Nowadays, the number of traffic accidents increases rapidly every year [6, 16]. Meanwhile, researchers have found that the driver behavioral errors caused more than 90% of the crash accidents [13], served as the most critical factor leading to the crash accidents. Therefore, how to effectively analyze the driver behavior