

论文与报告

简化路况模式下驾驶员情绪模型的研究

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摘要

驾驶辅助系统中的驾驶员模型较为单一, 没有考虑驾驶员的情绪状态对驾驶策略的影响. 为此, 本文研究了简化路况下驾驶员的情绪模型. 基于OCC (Ortony-clore-collins) 模型、情绪状态自发转移过程的马尔科夫模型和情绪状态刺激转移的隐马尔科夫模型(Hidden Markov model, HMM), 本文提出路况变化和无路况两种情况下的情绪模型, 并对驾驶员的跟驰、切换车道和超车过程中的情绪变化进行了研究. 在自发转移过程中, 结合情绪实时变化的特性, 提出了时变的自发转移过程, 而在情绪刺激转移中, 考虑了情感对刺激的记忆效应, 即同种刺激先后对情感影响不同. 讨论了认知情感的变化对驾驶策略的影响. 针对车距、路宽和周围车辆车速对驾驶员的情感影响程度、刺激敏感程度以及特定事件对驾驶员的影响过程, 进行了仿真实验, 预估出驾驶员在特定事件刺激下会采取何种驾驶策略. 并进行了实测数据验证, 实验结果验证了所提出模型的有效性, 为驾驶辅助系统中建立驾驶员模型提供了有借鉴意义的基础理论.

关键词 [驾驶员模型](#) [情感自发转移](#) [情感刺激转移](#) [隐马尔科夫模型](#)

分类号

Research of Driver Emotion Model under Simplified Traffic Condition

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Abstract

The current driver models in driver assistance systems are usually simple, which do not consider the influence of drivers' emotions on driving strategies. In order to address this issue, in this paper, we study the driver emotion model under simplified traffic conditions. Based on the OCC (Ortony-clore-collins) emotion model, the Markov model of the self-transition process of emotion states, and the hidden Markov model (HMM) of the transition of stimulation on emotion states, we propose two driver emotion models with varying road conditions and with unvarying road conditions, respectively, and we study the varieties of driver emotion during car following, lane switching and overtaking. For the self-transition process, we propose a time-varying self-transition process by taking the real-time varying characteristic of emotion into account; for the transition of stimulation on emotion states, we consider the memory influence of stimulation on emotion, i.e., the same stimulation but with different action time would have different influence on emotion. Meanwhile, we also discuss the influence of varying cognitive emotion on driving strategies. Simulation experiments are conducted on the following aspects: the influences of distance, lane width, and speeds of nearby vehicles on drivers' emotion, the sensitivity to stimulation, and the influence of specific event. The simulations predict what strategy the driver will take under the stimulation of specific event, and the predictions are then verified with real-world data. Experimental results demonstrate the effectiveness of the proposed model. The work proposed in this paper can provide a meaningful theory for building driver models in driver assistance systems.

Key words [Driver model](#) [the self-transition process of emotion](#) [the transition of stimulation on emotion](#) [hidden Markov model \(HMM\)](#)

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