

CHAPTER 19

Human-like driver model for emergency collision avoidance using neural network autoregressive with exogenous inputs

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19.1 Introduction

Rapid economic growth has generated an increase in transportation demand. However, the increasing number of vehicles on the road negatively impacts the transportation system and degrades the safety of road users, such as high levels of congestion, traffic deaths, injuries, and environmental pollution. Traffic dynamic systems are generally complex in nature and nonuniform. The unpredictable movement and interaction between heterogeneous road users make road traffic a complex system. WHO reported that around 1–1.24 million people are killed and 20–50 million are wounded annually on the world's roadways. Moreover, if the current trend continues for another decade, vehicle accidents might become the fifth leading cause of death by 2030, with an increased rate of 60%–70% [1,2]. As a result, road accident naturally constitutes negative impacts on global socioeconomics [3].

To reduce traffic collision-related issues and enhance safety levels in the vehicle, the vehicle's automation system should be improved and align with the human driver's expectations. Recently, the Intelligent Transportation System (ITS)-related area has attracted much attention from many researchers