Chapter 5
Machine Learning to Enhance Road and Traffic Safety for Senior and Disabled Citizens

Soorya Sathish
https://orcid.org/0009-0000-7692-2165
Heriot-Watt University, Dubai, UAE

Cristina Turcanu
https://orcid.org/0009-0003-2018-4935
Heriot-Watt University, Dubai, UAE

ABSTRACT

Machine learning (ML) models have the potential to improve road safety by predicting and preventing accidents. Building on this idea, this study examines how ML can enhance safe transportation for the elderly and people with disabilities, who often face significant mobility challenges. Traditional transport safety strategies tend to react to accidents rather than proactively address risks, further disadvantaging these vulnerable road users. This chapter explores how predictions based on specific ML models can analyse accident patterns and inform specific safety measures. By integrating AI-based accident prediction with intelligent traffic systems, adaptive signals, and accessibility-focused solutions, this research explores solutions and recommendations to guide urban planning and create safer and more inclusive transport networks tailored to those who need them most.

DOI: 10.4018/979-8-3373-2033-5.ch005

INTRODUCTION

Road traffic accidents are a public safety concern on the increase, resulting in thousands of deaths and millions of injuries globally every year. Older people and individuals with disabilities are primarily vulnerable in such accidents due to poor mobility, slower reflex, and increased dependence on accessible infrastructure. This research is significant in promoting public security and assisting the authorities in controlling traffic for the citizens whose mobility is certainly not their strong suit. As traditional measures of security continue to fail these groups, there is a pressing need for technology-based, preventive measures. This chapter explores the use of Machine learning to predict traffic crashes and contribute to more responsive, inclusive transportation systems that secure better and protect their peace of mind whilst their journey.

Motivation

Traffic crashes are a major cause of death and severe injury, high economic and personal expenses across the world. The World Health Organization reports that millions of people get injured or paralyzed every year from road accidents, which are among the top causes of death globally. Some of the most vulnerable populations are older citizens and those with disabilities, who are already posed at a greater risk due to limited mobility, weaker senses, and slower reactions. Traditional road safety systems are not necessarily designed with these groups in consideration. Because there are a lot of various contributory causes of traffic accidents, anticipating them precisely remains still a challenging job in spite of improvement in automobile safety technologies and traffic control technologies. There are some factors leading to car accidents, that includes weather conditions (such as rain or fog), lighting conditions (such as day or night), road surface type (such as dry, wet, or slippery), and the driver's demographics. The relationship between each of these factors can often be too complex for traditional methods to handle. Nevertheless, machine learning can potentially identify patterns in large datasets and better predict traffic crashes.

Aim and Scope

The aim of this chapter is to explain theoretically how machine learning can be utilised to improve road safety, with a special emphasis on its implications for elderly citizens and individuals with disabilities. The content is structured to elaborate

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Jennifer Courduff, Amy Duncanand Joanne Gilbreath (2014). *Assistive Technology Research, Practice, and Theory (pp. 192-206).*
www.irma-international.org/chapter/teacher-education-and-principles-of-effective-assistive-technology-implementation/93479