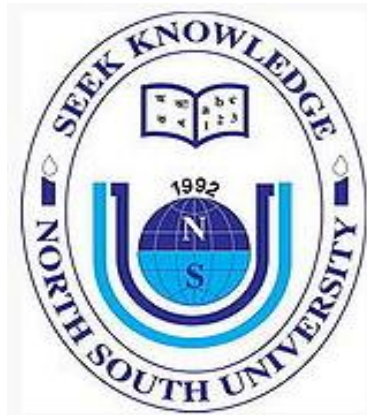

DISTRACTED DRIVER DETECTION USING MACHINE LEARNING AND DEEP LEARNING

Senior Design Project Report

CSE/EEE/ETE 499



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Agreement Form

It has been great pleasure for us to develop a Distracted driver detection using machine learning and deep learning. We have gathered sufficient knowledge and experience during this project. The authors of this paper would like to thank specially Dr. Shahnewaz Siddique to give us the opportunity on this noble project as well as helping us to establish this project. He encouraged us to seek out the clearest and deepest description of theoretical ideas as well as experimental findings. We are very grateful to him for his continuous support, advice and guidance.

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Abstract

One of the main reasons for most car accidents is distracted driving, which is the act of driving while engaging in other activities such as texting, talking on the phone, etc. Activities of that nature distract the driver from paying attention to the road. These distractions in turn compromise the safety of the driver, passengers, bystanders and others in other vehicles. 7,796 deaths due to accidents in 2018, a report of Bangladesh Passengers Welfare Association said at least 7,796 people were killed and 15,980 were injured in 6,048 accidents. The United States Department of Transportation states that one in five car accidents are caused by distracted drivers. This work looks at various images of distracted drivers taken from people performing different actions, some of which can be deemed as distracting whilst behind the wheel of a car. A mixture of various neural networks is used in order to more accurately predict what activity a driver is being distracted by.

Introduction

Distracted driving is an event that occurs when a driver diverts their primary focus of driving to another task or activity. Distracted driving is an ongoing problem that seems to only be getting worse with the dependence on technology. Not only is the general public becoming more reliant on vehicles, but also on distractions like cell phones and GPS systems within them. Most modern day vehicles come with touch screen navigation that requires some level of interaction to operate. Cellphones, too, are a big part of everyday life interactions, with constant incoming notifications and calls. These upward trends in dependence seem to have a correlation to the number of crashes as a result of distracted driving. In the province of Ontario, the deaths from crashes as a result of distracted driving have doubled since the year 2000, with one person being injured every half hour as a result of a distracted driver¹. Furthermore, in the United States alone, 425,000 people are injured and 3,000 are killed as a result of distracted driving, according to the Centers for Disease Control and Prevention (CDC) in 2015. The U.S. Department of Transportation National Highway Traffic Safety Administration (NHTSA) published a Research Note regarding Distracted Driving in 2015.

With our increased dependence on technology and cellphones, distracted driving is becoming an increased concern. Distracted driving does not just involve the use of cellphones but also includes eating, drinking, and even talking to a passenger whilst driving. This work aims to help amend this issue by automatically predicting if drivers are distracted, and what action is specifically resulting in the distracted driving. Three different models are implemented, from simple Convolutional Neural Networks (CNNs) to more complex ones involving Transfer Learning from other pre-trained models. The success of the models will hopefully, one day, aid combat the ongoing and increasing issue of distracted drivers on the roads.

Problem Statement