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**Introduction**

In today’s evolving world of technology, traffic sign classification is one of the hottest topics in computer vision. This is due to its applications in driverless cars, road safety and advanced driver assistance systems. Traffic sign classification involves recognising various sign images on the road and grouping them according to their respective classes. In a report by GOV.UK (2020), there were about 14266 reported vehicle accidents in 2018. Due to an increase in the number of road accidents daily, various governmental bodies have attempted to reduce this by introducing traffic lights, traffic signs, speed bumps, and roundabouts.

A lot of significant research has been carried out to solve the problem of traffic sign recognition for cars. However, some obstacles still linger when applied to real-world conditions, such as object variations, lighting, occlusions, limitation of the camera, and viewpoints (Madan, et al., 2019). The latest technology implemented in cars is the advanced driver assistance systems (ADAS). These assist drivers by automatically detecting traffic signs, recognising speed limits, detecting lane lines with the help of sensors and cameras installed in the car (Swathi and Suresh, 2017).

Before the emergence of deep learning (DL) algorithms such as the convolutional neural network (CNN), some traditional computer vision techniques like the histogram of gradients (HOG), colour and shape-based detection were used for identifying traffic signs (Tabernik and Skocaj, 2020). Due to the high performance of CNN in the 2012 ImageNet competition, it became the go-to algorithm for all image-related task such as recognition and identification (LeCun, Bengio and Hinton, 2015).

Since the release of ADAS, vehicle manufacturers have sort to improve this technology by complimenting it with DL algorithms. For this to be possible these models are expected to have high accuracy values. For this project, a custom classifier will be built and then compared with the original LeNet model. To assess their performance, both models are used to accurately classify a given traffic sign.

**Background**

German traffic sign recognition

benchmark (GTSRB) dataset (Stallkamp, et al., 2012),

Improving the accuracy of both

the detection and classification of traffic sign would increase the effectiveness of current

systems, and potentially play an important role in the development of future auto-pilot

computer systems.

**References**

GOV.UK. (2020) *Reported accidents, vehicles and casualties (RAS40).* Available at: <https://www.gov.uk/government/statistical-data-sets/ras40-reported-accidents-vehicles-and-casualties>. [Accessed 1st July 2020].

Swathi, M. & Suresh, K.V. (2017) ‘Automatic traffic sign detection and recognition: A review’.

*International Conference on Algorithms, Methodology, Models and Applications in Emerging*

*Technologies (ICAMMAET).* pp.1-6.

Madan, R., Agrawal, D., Kowshik, S., Maheshwari, H., Agarwal, S. & Chakravarty, D. (2019) ‘Traffic Sign Classification using Hybrid HOG-SURF Features and Convolutional Neural Networks’. *ICPRAM*. pp.613-620.

Tabernik, D. & Skocaj, D. (2020) ‘Deep Learning for Large-Scale Traffic-Sign Detection and Recognition’. *IEEE Transactions on Intelligent Transportation Systems*. 21(4), pp.1427–1440.

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LeCun, Y., Bengio, Y. & Hinton, G. (2015) ‘Deep learning’. *Nature*. 521(7553), pp.436–444.

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Bagloee, S.A., Tavana, M., Asadi, M. & Oliver, T. (2016) ‘Autonomous vehicles: challenges, opportunities, and future implications for transportation policies’. *Journal of Modern Transportation*. 24(4), pp.284–303.

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(Bagloee et al., 2016)