According to Qian et al. (2016) traffic sign recognition is essential in many modern applications, including traffic mapping, traffic monitoring, and self-driving or driverless autos. As a benchmark dataset, specifically tailored for traffic sign recognition, the German Traffic Sign Recognition Benchmark Dataset (GTSRB) (Stallkamp et al., 2011) is used. In contrast to earlier Convolutional Neural Network (CNN) approaches that employed CNN as a feature extractor and Multi-Layer Perception (MLP) as a classifier, this study suggested Max-Pooling Positions (MPPs) in conjunction with CNN as an efficient discriminative feature to predict category labels for traffic sign recognition. Multiple convolutional layers, activation layers, max pooling layers, fully connected layers, and a soft-max layer for classification are all part of the CNN architecture. The model gains strong representation capabilities when MPPs are used in conjunction with CNN. This helps the model increase its accuracy from 96.95% (CNN-MLP scheme) to 98.86%.

Arcos-García et al. (2018) used a Deep Neural Network with Convolutional layers and Spatial Transformer Networks (STNs) to conduct a number of classification experiments on the GTSRB and BTSD (Belgium Traffic Sign Dataset) datasets. This research compared several optimization techniques, such as Adam, RMSprop, SGD with Nesterov momentum (SGD-Nesterov), and stochastic gradient descent (SGD). Convolutional and spatial transformer modules are the fundamental building pieces of the suggested CNN paradigm. This study also examines the effects of integrating Spatial Transformer Networks (STNs) with CNN in various combinations at various locations. The authors' proposed CNN with three Spatial Transformer Networks and SGD without momentum as the loss function optimizer allowed this study to reach an astounding 99.71% accuracy rate.

The German Traffic Sign Recognition Benchmark dataset was used in a comparison study by Ay et al. (2022) to evaluate the validation performance of the AlexNET, DarkNET-53, and EfficientNET-b0 convolutional neural network (CNN) algorithms. According to this study, EfficientNET-b0 performs better than the other two algorithms, with an impressive accuracy of 98.64%, whereas AlexNET and DarkNET-53 have accuracy rates of 97.45% and 94.69%, respectively.

In a number of studies, Vgg-16 was tested on the GTSRB dataset. With four layers (Flatten, BatchNormalization, and two dense layers (256 and 205 units, respectively) on top the the vgg16 model it achieved 86.39% accuracy on the dataset GTSRB plus 162 custom classes (Singh et al., 2023). This model achieved 95.5% accuracy with 16 trainable layers (Jonah et al., 2021). When the AdaBound optimiser was tested using vgg-16, the accuracy increased to 98.70% on the preprocessed dataset (Bi et al., 2021).

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