Traffic sign board detection and voice caution system

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Problem statement

In the past we have seen many machine learning models like Random Forest,KNN and SVM that have been used to detect traffic signs.These have proven to be satisfactory but don't yield great accuracy.We are proposing a CNN model which yields better accuracy with voice alert which cautions the driver of the respective traffic sign.

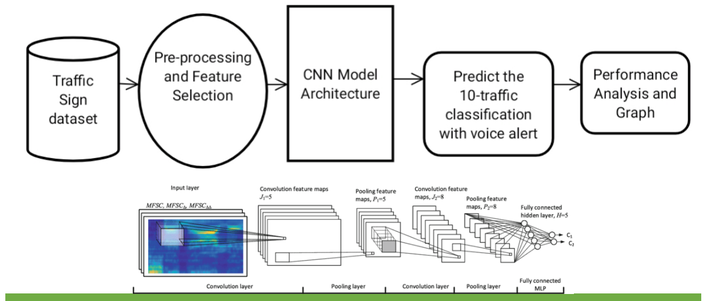
Background

After rigoursly going through the literature survey Implementation of other machine learning models like Random forest,KNN and SVM with high accuracy was not possible.But eventually CNN model was found to yield best results with voice alert to the driver.

Dataset and Features / Project Requirements / Product features

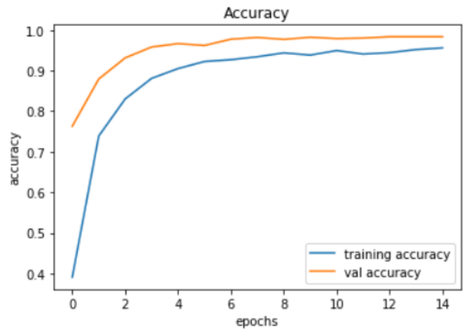
We are using the GTSRB dataset here as this is synonymous to the Indian traffic scenario.We have considered two types of signs they are namely cautionary and speeds signs and with 5 classes each.In this project demo we have used CNN model which gives higher accuracy.The novelty in the project is the voice alert we will give to the driver.

Design Approach / Methods



Results and Discussion

The model is accurate up to 95.6% with a validation accuracy of 98.25%.The model can be tweaked in future in order to obtain accuracy of higher standard.The saved data can be used for creating another model as well.The web application works flawlessly.he model predicts all the signs correctly.
However, fails to predict unknown signs.A class ‘Unknown’ is created to classify the wrong ones.



Summary of Project Outcome

The (Vanilla) Convolutional Neural Network is used to implement the Traffic Sign Board Detection and Voice Alert System.The model's accuracy has increased as a result of the different classes that have been created for each traffic sign.
Following the identification of the sign, an audio message warns the motorist, assisting him or her in making the right choices.
Additionally, this system can be readily put into use without requiring a lot of hardware, broadening its application.

Conclusion and Future work

The prototype can be built with an integrated alert system and a camera in the vehicle's centre.The ability to obtain an estimated time for reaching that specific traffic sign can be added.The system could be expanded to identify traffic signals.

References

[1] Tabernik, D. and Skočaj, D., 2020. Deep learning for large-scale traffic-sign detection and recognition. IEEE transactions on intelligent transportation systems, 21(4), pp.1427-1440.
[2] V. Balali, A. A. Rad, and M. Golparvar-Fard, “Detection, classification, and mapping of U.S. traffic signs using Google street view images for roadway inventory management,” Vis. Eng., vol. 3, no. 1, , 2015, p. 15.

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