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TRAFFIC SIGN DETECTION USING MACHINE LEARNING

Guided by
Prof. Sumeet Mali

Anish Jain[1], Chaitanya Kariya [2], Tirth Jain[3]

[1] *Computer Science , NBN Sinhgad School of Engineering , Pune*
[2] *Computer Science , NBN Sinhgad School of Engineering , Pune*
[3] *Computer Science , NBN Sinhgad School of Engineering , Pune*

Abstract — ***Our road system will not be complete without traffic signals. They offer important guidance to road users, and often persuasive advice, which allows them to change their driving behaviour to ensure compliance with whatever road regulations are currently in effect. To identify and classify traffic signs in the past, traditional computer vision techniques were used, but this involved intensive and time-consuming manual work to handcraft essential features in pictures. Instead, we build a model that accurately classifies traffic signals using deep learning, which learns to find the most suitable features for this problem on its own. This seminar covers the identification and understanding of road signs, which is essential for a variety of expert programs, such as driver assistance and self-handling. In this article, the method of identification and recognition for Indonesian road signs was examined. A detailed study of different classification methods for detecting signs is carried out, with the findings demonstrating the reliability and accuracy of each process in terms of Precision and Recall.***

I. INTRODUCTION

Traffic signals play an important part in our daily lives. They provide critical intelligence that ensures the welfare of everyone in our immediate surroundings. Without traffic lights, no driver would know what was ahead of them, and highways could become a shambles. Every day, over 3,280 people are killed in road collisions, according to international global roach crash estimates. These numbers would be much higher if there were no streetlights. Developers and major companies, on the other hand, are pouring a lot of work into creating self-driving car solutions. Tesla, Uber, Google, Audi, BMW, Ford, Toyota, Mercedes-Benz, Volvo, and Nissan are only a few examples. These self-driving vehicles must obey traffic rules, which necessitates an interpretation of the messages received by traffic signals.

II. Motivation

The majority of auto crashes are caused by human error, such as drivers failing to see a traffic sign or going in the opposite direction of a traffic sign (i.e. traffic sign setting speed at 100 KM and driver driving at a greater speed). As a consequence, in this lecture, we looked at the method of traffic sign identification and recognition, as well as how to identify traffic signs into various groups in real-time and prevent recognition errors.

III. LITERATURE REVIEW

In paper [1] auther Ayoub Ellahyani, Mohamed El Ansari, Ilyas El Jaafari describes that the descriptor was created by applying the directed gradient (HOG) characteristics histogram to the HIS Color space and integrating it with the features of local self resemblance (LSS). Random forest and support vector machine (SVM) classifiers were evaluated in combination with a new descriptor as classifiers. This essay breaks down the process of identifying and recognising traffic signals into three phases. The image is first segmented using HSI color space section thresholding. The second step uses the blobs removed in the first step to track traffic signals. The final one is in charge of identifying the identified road signals. The German Traffic Sign Identification and Recognition Benchmark and the Swedish Traffic Signs Data sets were used in the study.

In paper [2] Author Md. Abdul Alim Sheikh, AlokKole, TanmoyMaity describes For grouping, a neuronal network is used. Stop signs and no entry signs are among the four categories of traffic signals considered for review. The detection accuracy is over 88 percent and the identity rate is over 90 percent. They implemented the proposed framework in several modules, the first of which is the detection module, which uses color segmentation to remove the area of interest from an image. The artificial neural network is used in the second module to perform the identification and classification tasks. They used four types of traffic signs to assess the proposed system: Give Way Sign, No Entry Sign, Stop Sign, and Speed Limit Sign.

In paper [3] author P.SivagnanaSubramanian, Dr. S.Ganeshvaidyanathan describes that Using Real-time resources and with reduced time complexity Ambience, identified traffic signs with differences in lighting, partial occlusion, and less computational classification. The kalman filter is used to approximate traffic signals, the histogram of directed gradient (HOG) is used to remove characteristics, and SVM is used for classification and prediction. The answer obtained from the motion model if the motion model tracks the traffic sign within the predefined distance measure between the frames is the final traffic sign detection output.

In paper [4] author FatinZaklouta and Bogdan Stanciulescu describes that the efficacy of k-d trees, random woods, and support for k-d trees is both investigated in this article. Different-sized histogram-of-oriented gradient (HOG) descriptors and vector machines (SVMs) were used for traffic sign classification. They used the Fisher's criterion and random forests for feature selection to reduce memory requirements and improve accuracy, and the German Traffic Sign Recognition Benchmark (GTSRB) data set was used for testing.

In paper [5] author FatinZaklouta , Bogdan Stanciulescu describes that the K-d tree is used to define the content of the symbol, and an efficient linear vector support machine (SVM) with (HOG) is used to detect it. The ROIs were determined using a chromatic filter. On their sample, the Random Forests outperform the one-vs-all SVMs. They also use bagging to create an ensemble of SVMs and a boosted ensemble of Naive Bayes classifiers, which improves the non-ensemble version's efficiency. To reduce the function's space and speed up categorization, the Random Forest and Fisher's Criteria are used.

IV. PROBLEM STATEMENT

Our road system will not be complete without traffic signals. They offer important guidance to road users, and often persuasive advice, which allows them to change their driving behaviour to ensure compliance with whatever road regulations are currently in effect. We will decide the best approach to classifying traffic signals and compare algorithms based on precision and execution time in this lecture.

V. SYSTEM ARCHITECTURE

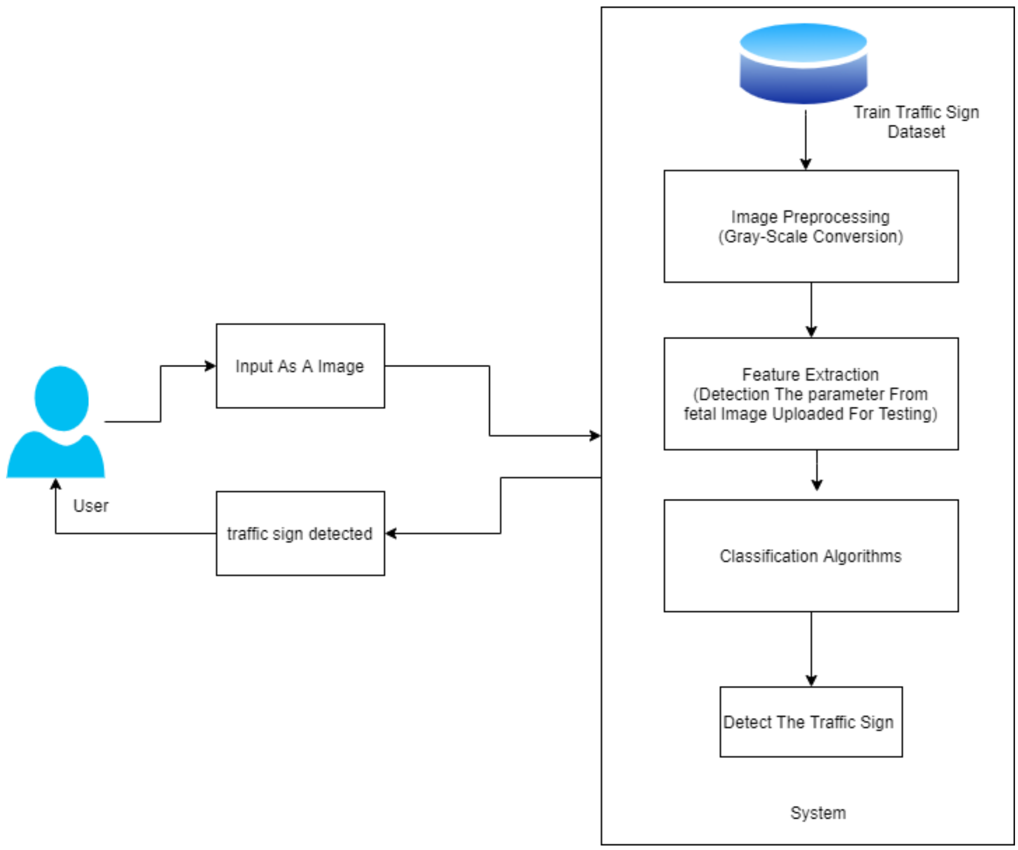

Figure 1. System Architecture

5.1. EXPLAINATION:

5.1.1 Prepossessing : The use of numerical algorithms to perform image processing on digital images is referred to as camera processing. As a subfield of optical 16signal imaging, picture scanning has a variety of benefits over analog image processing. It makes it possible to apply a much broader variety of algorithms to the input data. Image processing aids in the enhancement of image data (features) by removing unnecessary distortions and/or enhancing key image functionality, enabling our AI-Computer Vision models to work with more precise data.

5.1.2 Feature Extraction: We treat the pre-trained network as an arbitrary feature extractor, allowing the input image to propagate forward, stopping at pre-specified layer, and taking the outputs of that layer as our features.

5.1.3 Classification: In the field of computer vision, image classification is a difficult challenge. The deep learning algorithm is a computerized model that simulates the functions and operations of the human brain. Deep learning model training is an expensive method in terms of computer capital and time.

VI. CONCLUSION

For the automatic detection and identification of traffic signals, we looked at a few machine learning algorithms. For identification, a cascade of support vector machine (SVM) classifiers trained with HOG features is used. For recognition, both KNNs and neural networks may be used. In traffic sign recognition functions, the performance table indicates that neural networks do better.

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