Traffic Sign Classification

PROJECT SYNOPSIS

Machine Intelligence

BACHELOR OF TECHNOLOGY- V Sem CSE

Department of Computer Science & Engineering

SUBMITTED BY

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Abstract and Scope

Traffic Sign classifier is very crucial in the current era of self-driving and autonomous cars. Due to high-speed movement of vehicles and criticality of the situation, recognition and classification accuracy is particularly important.

This problem has two aspects, first is feature extraction i.e., extracting relevant features from the traffic sign images and second is image classification, which includes classification of an image to its corresponding class based on the extracted features.

Identification of the traffic and taking appropriate action is crucial for an automated vehicle. This system will assist drivers by recognizing traffic signs which they did not recognize before passing and will save them from miss-happenings. Solve this problem, we are using Deep Learning, specifically Convolutional Neural Network (CNN).

Keywords—CNN, LeNet, Re-LU, Adam Optimizer.

Feasibility Study:

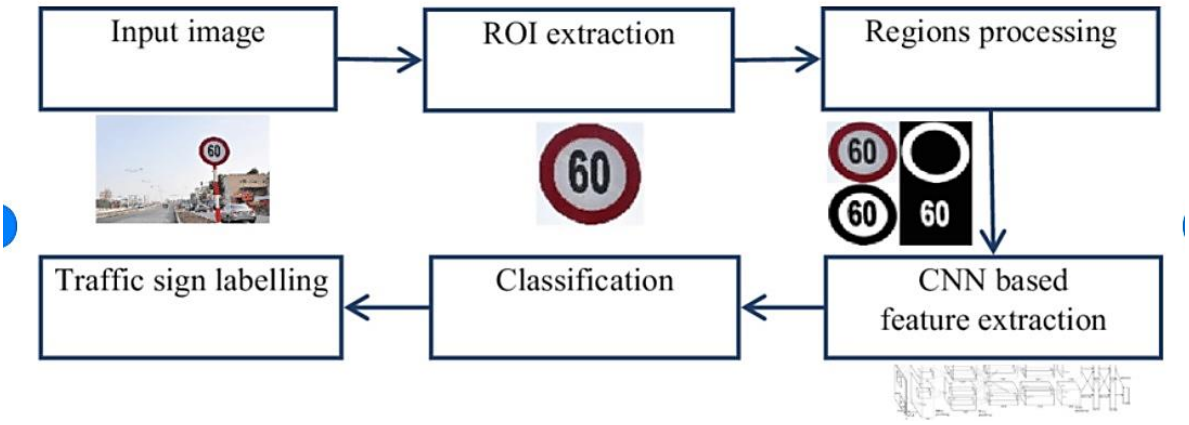
- Need of the project:
  - Enhance the recognition of sign boards and take necessary actions by the smart vehicles.
  - Aid humans to recognize the sign boards in case they miss the same while driving.
  - Help non-native drivers recognize the sign boards.
  - Facilitate drivers focus on their driving more than searching out for instructions from the sign boards.
- Significance:
  - We are trying to achieve minimum road accidents related to misunderstanding or missing Sign board instructions.
  - Trying to achieve accuracy above 50% in recognizing the sign boards and above 70% in classifying them as traffic signboards or not.
  - Applying knowledge of theory of ML/DL into reality and problem solving.

Design Approach/ Methodology/ Planning of work:

The CNN model architecture is built using the following steps:

1. Sequentially add the layers in the order: Two convolutional layers, one pooling layer, dropout layer, flattening layer, dense layer, again a dropout layer and finally the dense layer.

2. In the convolutional layer, the number of filters is specified. It performs the convolution operation on the original image and generates a feature map.
3. The Re-LU performs the maximum function to convert the negative values to zero without changing the positive ones and generate a rectified feature map. The Pooling layer takes the rectified feature map and performs a down-sampling operation (like Max Pooling or average pooling) and thus reduces the dimensionality of the image.
4. The flattening layer is used to convert the input feature map to a one-dimensional array.
5. The dropout layer is used to avoid overfitting by setting some of the input neurons to zero during the training process.
6. After addition of the layers, the model is to be and assign the loss. The reason for specifying this loss function is that the proposed system is a multiclass classification problem, where multiple classes are considered but one image belongs to exactly one class.
7. Finally, the predictions on the test data are done to verify the success rates.



References:

1. https://www.researchgate.net/figure/Overview-of-traffic-sign-recognition-architecture_fig2_323161448(for image).
2. https://doi.org/10.22214/ijraset.2022.40224
3. Traffic Signal Classification with Cost-Sensitive Deep Learning Models | IEEE Conference Publication | IEEE Xplore