Deep Learning – Case Study

Traffic Signs Classification using ResNet

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1. Introduction

This case study is designed to Classify the traffic signs. It uses the Sequential and ResNet model for the images. The model built is able to grid the image and train model accordingly and then predict the sign from them.

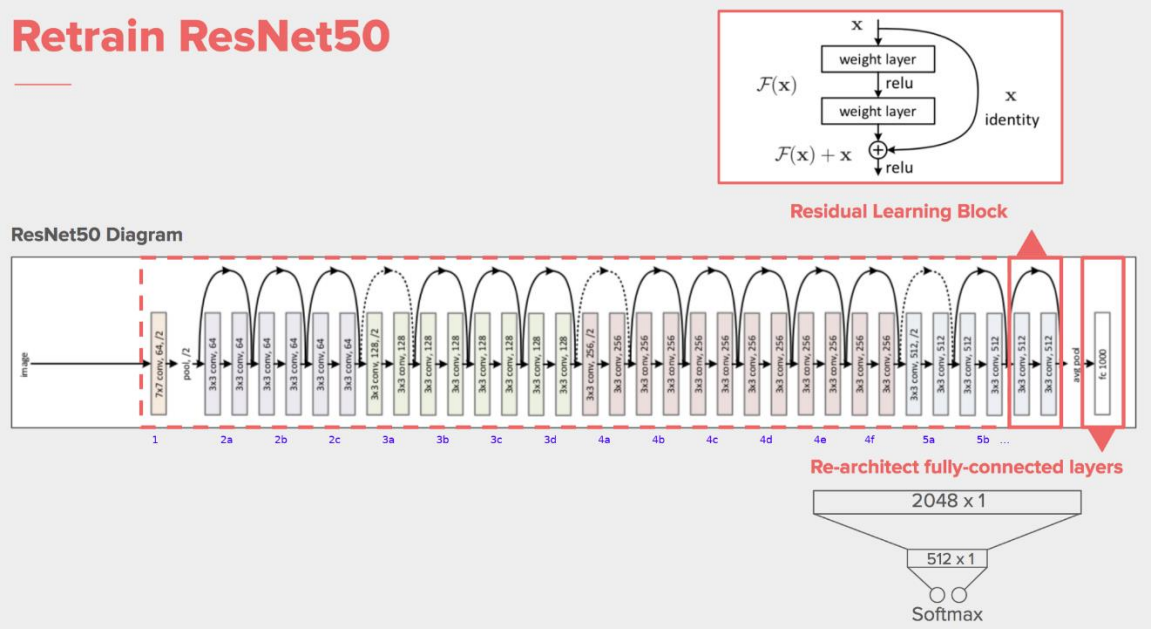
This case study can be used across various sectors where there is a need to have the Traffic sign classification. Also, if this model is trained with more resources like GPU, RAM then it can be expanded to cover variety of traffic signs categories.

2. Tools and Technologies

Tools and Libraries	Usage
Keras	This library is used for building the network architecture. It allows us to use several layers, callbacks, and InceptionResNetV2 model.
Sequential	A Sequential model is appropriate for a plain stack of layers where each layer has exactly one input tensor and one output tensor.
matplotlib	Matplotlib is a plotting library for the Python programming language and its numerical mathematics extension NumPy.
Kaggle	Used as a platform to execute code as well as manage datasets and model weights

3. Model Explanation and Architecture

ResNet, short for Residual Networks is a classic neural network used as a backbone for many computer vision tasks. This model was the winner of ImageNet challenge in 2015. The fundamental breakthrough with ResNet was it allowed us to train extremely deep neural networks with 150+layers successfully. Prior to ResNet training very deep neural networks was difficult due to the problem of vanishing gradients.



4. Working

The images we use daily contains multiple traffic signals The values of these channels can vary from 0 to 255. While training the model, we use the traffic signals images here we define the number of classes is 43 and number of channels is 3 and a s preprocessing we have to resize the image in 224 * 224 format. In the project dence layer activation is “softmax” and objective function is categorical_crossentropy (Used as a loss function for multi-class classification model)

Here we define number of epoch is 10, and the early stop patience is 3 and now we have to load dataset and pickle file

Now Preparing y_train and y_validation for using in Keras num_classes: Total number of classes. If nothing is mentioned, it considers the largest number of the input vector and adds 1, to get the number of classes.Its default value is "None".

And then we have to convert all sample images into the grid and plot them for better understanding, then we have to train our model and test it with some input images of traffic signals.

5. Code

https://github.com/manavshah123/Traffic-Signs-Classification

** Code and Report is available in the GitHub repository.

6. Output

```
(1, 32, 32, 3)
[3]
```

```
(1, 43)
ClassId: 3
Label: Speed limit (60km/h)
```
