

Abstract

The goal of this project is to use Deep Learning tools such as Convolutional Neural Network to build a multi-class classification model to classify road signs. Building a reliable traffic sign recognition will help accelerate the growth of in developing and operating autonomous vehicles. This traffic sign recognition model will identify which class the sign belongs to such as stop signs, traffic lights or speeding signs.

Design

The first step for a first-time driver's license applicant is to pass the driving written test which contains identifying and understanding road signs. To keep our cities safe, all auto operators must recognize and abide by the rules on the road. With the growth of autonomous devices living with us, it is important for these autonomous devices to understand and communicate with humans.

Therefore, a deep learning model was built to classify the class a road sign belongs to such as speed limits, stop signs, turn right or left, etc... This model will help with the interaction of machines and humans to produce a productive society.

Data

The data is from The German Traffic Sign Recognition Benchmark. It contains over 50,000 images with traffic signs with 43 classes.

- Single-image, multi-class classification
- Over 50,000 images
- 43 Classes
- Different size images
 - - Image sizes vary between 15x15 to 250x250 pixels

To access and view a detailed description of the dataset, click here https://benchmark.ini.rub.de/gtsrb_news.html

Standard Machine Learning Algorithms

Baseline models using standard Machine Learning classification algorithms:

1. Logistic Regression
2. Random Forest
3. K-neighbors

Convolutional Neural Network Algorithms

Convolutional neural network models:

1. CNN Model with 269,643 parameters
 2. Transfer Learning using VGG19
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TOOLS

The following tools were used in this project:

1. Python & Pandas to clean, explore and generate the final modeling data
 2. SKLearn to build baseline Machine Learning classification models and measuring metrics
 3. Keras and TensorFlow to build Deep learning classification models
 4. Matplotlib and Seaborn to generate visualizations
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Communication

The findings and slide deck accompanying this project's presentation are accessible in this GitHub repository.