UDACITY

MACHINE LEARNING ENGINEER NANODEGREE

Capstone Proposal

Traffic Signs Classification

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Domain Background

In this project, I will perform the traffic signs classification using the data provided by International Joint Conference on Neural Networks (IJCNN) in 2011 for a competition (available in public domain). Traffic signs classification is an important task in self-driving cars. Thus, I will build a model to classify the German traffic signs to one of the 43 classes.

Problem Statement

The problem statement for this project is **"How to classify the German Traffic Signs to their respective classes"**. I will use a supervised learning approach to extract the features from data and trained the model to get desired results.

Datasets and Inputs

I will preprocessed pickled data provided in link of almost 50k images and I will create the array of labels for all the signs classes.

traffic-signs-data.zip

train.p

valid.p

test.p

Solution Statement

I will preferably use a convolutional neural network to classify the images to their respective class as they are best suitable for image classification. After analyzing many architectures I think **LeNet-5** architecture will be best suitable for this job. Since at this point this is just a proposal, and for now there is no way to predict how good of a fit this approach can be, I shall keep an open mind to tried different approaches that can reveal themselves to be more suited.

Benchmark Model

For this problem it is suggested to use **LeNet-5** based on consulted data sets of historical relevance on Kaggle and different blogs performing nearly +80%.

Evaluation Metrics

As it is supervised problem. accuracy is the best metric for evaluating this model. Probably the confusion matrix to visualize the predictions of model.

Project Design

1- **Data Loading:** I will load the data and I have found the preprocessed data and raw pickled data as well. I will use the preprocessed pickled data.
2- **Data Visualization:** I will visualize the few samples of preprocessed data for training, validation and testing.
3- **Data Normalization:** I will normalized the data for training, validation and testing.
4- **Model Selection:** I will select model and build the model with desired number and type of layers.

5- **Model Tuning:** Once we find the model that best suits our data, adjust model parameters within a range that allows for increased performance without over fitting.
6- **Test and Predict:** use the previously proposed metric, explained in the table present in the section for evaluation metrics as an indicator of success in our predictions.

Works Cited

Citation J. Stallkamp, M. Schlipsing, J. Salmen, and C. Igel. The German Traffic Sign Recognition Benchmark: A multi-class classification competition. In Proceedings of the IEEE International Joint Conference on Neural Networks, 2011.

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