Spring 2020 Machine Learning Final Project Proposal

**Chinese Traffic Sign Recognition Based on Annotated Street View Images**

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**1 Project Description & Goals**

“Before self-driving vehicles can truly operate autonomously, they need to master Street Sign 101” (quote from [Citylab](https://www.citylab.com/transportation/2017/02/how-to-teach-a-car-a-traffic-sign/516030/)). Our machine learning final project is here to empower self-driving cars to recognize street signs from various angles and under different weather and lighting conditions. We would like to start local and train our CNN model by feeding it the most common categories of Chinese traffic signs. Once we achieve a relatively high test accuracy on images with a single traffic sign, we will be able to apply our model on images with multiple traffic signs. To test the model’s ability of generalization, we can take pictures of traffic signs near campus or dorms to test how well the model does.

**2 Data Source**

We plan to use the traffic sign recognition database (TSRD) from [Chinese Traffic Sign Database](http://www.nlpr.ia.ac.cn/pal/trafficdata/index.html) as our data source, supported by the National Nature Science Foundation of China (NSFC). TSRD includes 6164 traffic sign images, each containing one traffic sign. All images are annotated with the coordinates of the sign and its category (58 categories in total). As the categories in the dataset are only marked by numbers, we will manually label 58 categories with actual meanings in English. Owner of the database separates TSRD into a training set of 4170 images and a test set of 1994 images, but we will merge the two sets together and divide the training, validation and test sets ourselves. Originally, the test set is quite imbalanced, so by re-separating the entire dataset, we are hoping to deal with the problem of data imbalance at the same time. As for further efforts, we will try oversampling or K-fold cross-validation and bootstrapping to tackle imbalanced data. Some images may seem exactly the same, but the given coordinates of the traffic signs are different, so we do not need to delete duplicate images. Since all the images are PNG files, we will start from importing Image from PIL to transfer all the images to numpy arrays and then tensors to fit the convolutional neural network. Meanwhile, we will resize and normalize the images.

**3 Methodology**

From what we have learned in class, convolutional neural networks is the optimal model for color image classification. We expect to build a traffic sign classifier based on convolutional neural networks. We will research more on which specific CNN we should choose and perhaps try out different kinds if time permits.