Advanced Driver Assistant System

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Motivation

Advanced driver assistant systems (ADAS) have been implemented in many vehicles to help increase both the safety of drivers and pedestrian. The related technology is also used to develop self-driving cars.

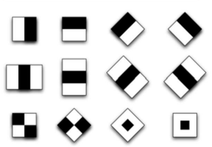
Goal & Objective

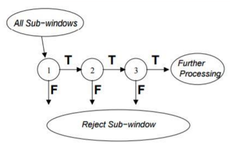
- Traffic Sign Recognition
- Lane Deviation Detection
- Car make identification based on behind views of cars

Traffic Sign Recognition

Method: Viola and Jones Detector

Haar –like Feature extraction → Cascade of Adaboost classifier → Traffic Sign Detector





Car Make Identification

Acura ILX

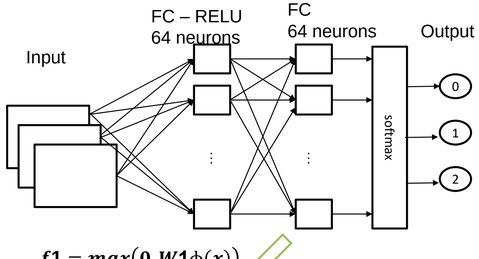
Honda Civic

Hyundai Sonata

Dataset: 120 photos of each car make's behind view

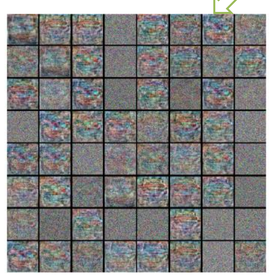
- ❑ **Training Set:** 100 photos of each car make randomly chosen from the dataset
- ❑ **Testing Set**: 20 photos of each car make randomly chosen from the dataset

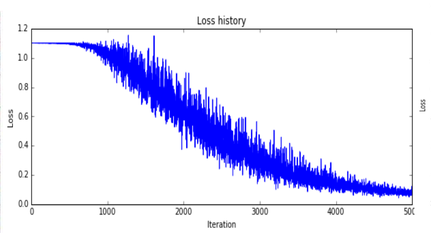
Method 1: 2 Layer Neural Networks



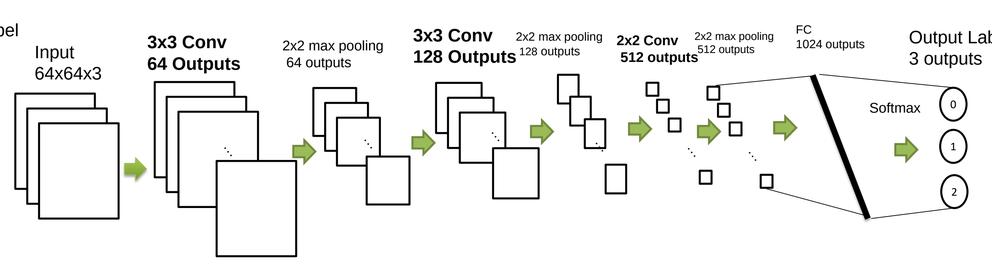
$f1 = max(0, W1\phi(x))$

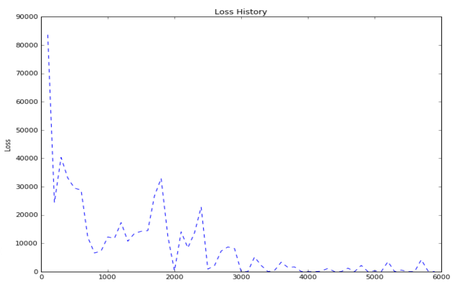
$f2 = W2f1(x)$





Method 2: Convolutional Neural Networks





Method	Accuracy
NN	75%
CNN	78%

Future Work

1. More robust traffic sign recognition
2. Deeper CNN and larger car database

Lane Detection & Stability Determination

Edge Detection → Hough Transform & Hough Peak Detection → Lane Detection

Reference

[1] P. Viola and M. Jones, "Rapid object detection using a boosted cascade of simple features," Proceedings of the 2001 IEEE Computer Society Conference on Computer Vision and Pattern Recognition. CVPR 2001, 2001, pp. I-511-I-518 vol.1.doi: 10.1109/CVPR.2001.990517

[2] Tensorflow Tutorial https://www.tensorflow.org/versions/r0.12/tutorials/index.html

[3] LISA Traffic Sign Dataset http://cvrr.ucsd.edu/LISA/lisa-traffic-sign-dataset.html

[4] Car make datasets are from Google image search