Distracted Driver Detection

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I. Project Description

Build a Traffic Sign Recognition Project

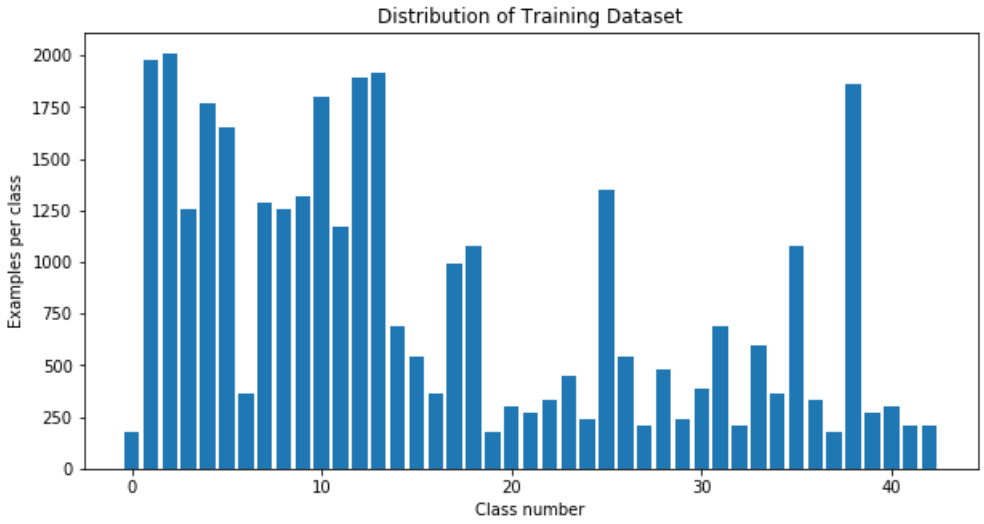
The goals / steps of this project are the following:

- Load the data set (see below for links to the project data set)
- Explore, summarize and visualize the data set
- Design, train and test a model architecture
- Use the model to make predictions on new images
- Analyze the softmax probabilities of the new images
- Summarize the results with a written report

II. Dataset

1. Data exploratory and visualization

```
Number of training examples = 34799
Number of testing examples = 12630
Image data shape = (32, 32, 3)
Number of classes = 43
```



III. Method

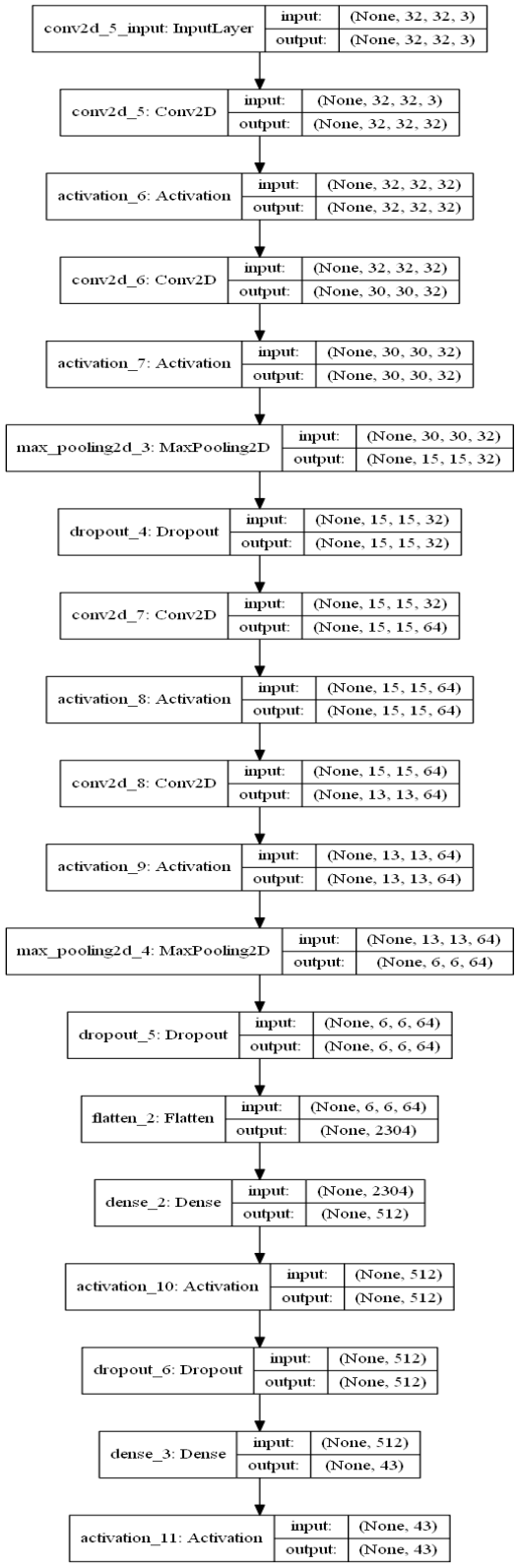
1. Data Preprocess

One-hot encoding: y_train, y_valid, y_test

Augmentation: randomly rotate images in 10 degree; randomly shift images horizontally and vertically 10% of the image width and height.

Normalization: X_train, X_valid, X_test are divided by 255.

2. Model


conv2d_5_input: InputLayer
input: (None, 32, 32, 3)
output: (None, 32, 32, 3)
conv2d_5: Conv2D
input: (None, 32, 32, 3)
output: (None, 32, 32, 32)
activation_6: Activation
input: (None, 32, 32, 32)
output: (None, 32, 32, 32)
conv2d_6: Conv2D
input: (None, 32, 32, 32)
output: (None, 30, 30, 32)
activation_7: Activation
input: (None, 30, 30, 32)
output: (None, 30, 30, 32)
max_pooling2d_3: MaxPooling2D
input: (None, 30, 30, 32)
output: (None, 15, 15, 32)
dropout_4: Dropout
input: (None, 15, 15, 32)
output: (None, 15, 15, 32)
conv2d_7: Conv2D
input: (None, 15, 15, 32)
output: (None, 15, 15, 64)
activation_8: Activation
input: (None, 15, 15, 64)
output: (None, 15, 15, 64)
conv2d_8: Conv2D
input: (None, 15, 15, 64)
output: (None, 13, 13, 64)
activation_9: Activation
input: (None, 13, 13, 64)
output: (None, 13, 13, 64)
max_pooling2d_4: MaxPooling2D
input: (None, 13, 13, 64)
output: (None, 6, 6, 64)
dropout_5: Dropout
input: (None, 6, 6, 64)
output: (None, 6, 6, 64)
flatten_2: Flatten
input: (None, 6, 6, 64)
output: (None, 2304)
dense_2: Dense
input: (None, 2304)
output: (None, 512)
activation_10: Activation
input: (None, 512)
output: (None, 512)
dropout_6: Dropout
input: (None, 512)
output: (None, 512)
dense_3: Dense
input: (None, 512)
output: (None, 43)
activation_11: Activation
input: (None, 43)
output: (None, 43)

3. Train

Optimizer: adam Batch size: 64 Epochs: 20

IV. Result

Training set accuracy: 97.13%

Validation set accuracy: 98.62%

Test set accuracy: 97.70%

Test on 5 New Images

Accuracy: 100%

The probability of how certain a prediction was made:

100%, 99.15%, 64.41%, 98.55%, 100%