

EMPIRICAL EXPERIMENTS ON TRAFFIC SIGN RECOGNITION

Group No.7

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INTRODUCTION

Based on the provided begin code, we test different techniques on traffic sign recognition. We compare the accuracy with different classifiers and different preprocess methods (including data augmentation). We also compare the accuracy with convolutional neural networks (CNNs). We also find other new dataset to test our methods.

During the experiments, we find out that the Range of Interest (RoI) can improve the accuracy of models significantly, so we try to use image processing techniques to propose Rols automatically.

PIPELINES

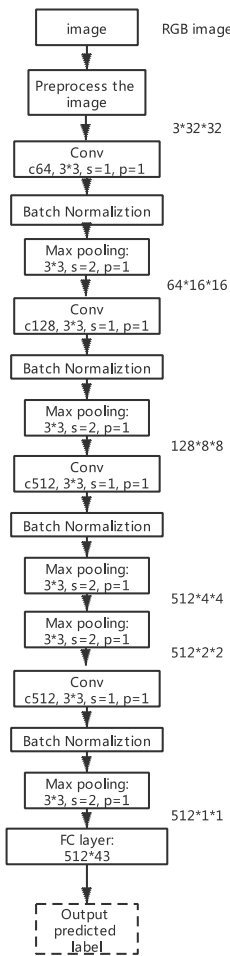
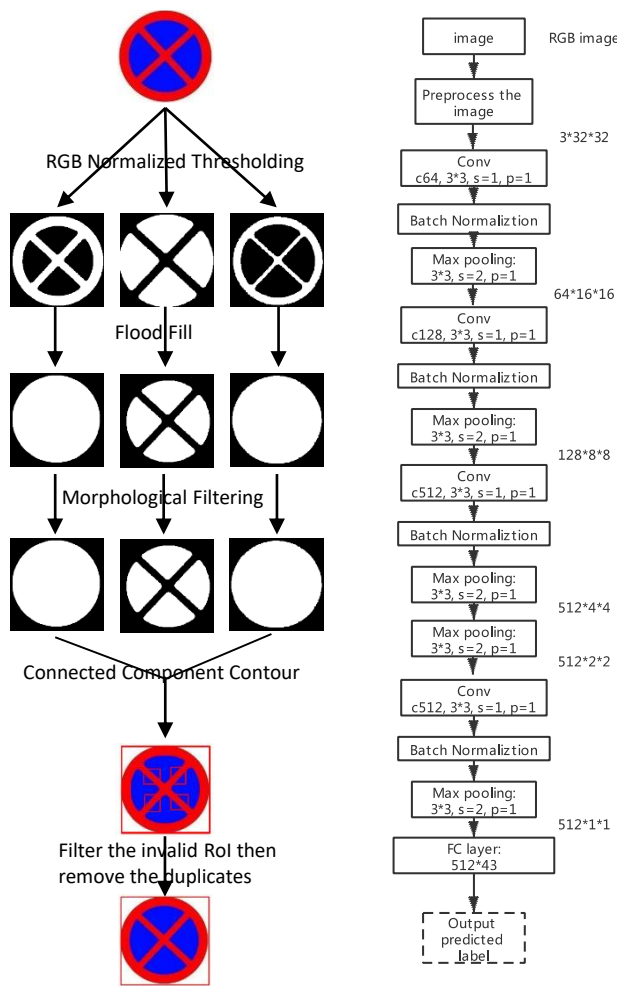


Fig1. pipelines for RoI generation Fig2. pipelines for CNN

PARTIAL RESULTS

Here shows some accuracy of recognition using different methods. More information can be found in the slides.

- Different classifiers

Classifier	SVM	RF	Gaussian	KNN
Dataset 1	94.71%	97.40%	78.62%	95.20%
Dataset 2	92.33%	88.66%	74.63%	91.67%
Dataset 3	90.78%	91.11%	88.63%	97.73%

- RoI generation for training

	Without Rols	Genrated Rols	Ground True Rols
Dataset 1	0.94	0.96	-----
Dataset 2	0.80	0.75	0.91

- CNN classifier

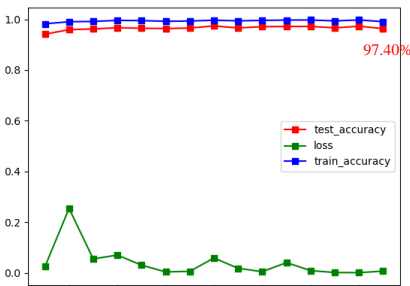


Fig3. The accuracy and loss curve for CNN on GTSRB. X-axis represents the number of the epoch and the Y-axis the accuracy(loss) value of the CNN.

CONCLUSION

The experiments prove the effectiveness of traditional image processing and classifiers on this task. We also use color division to generate RoI of images. It improves the accuracy of model trained on the simpler dataset. However, the detection fails when the luminance is low or the noise is large.

There is still some difficulties in this task. For example, small scale images, low luminance images and noisy images are difficult for not only traditional methods but also DNN classifier. In the future, more preprocessing can be done to eliminate these deficiencies.