Research On Intelligent Recognition Technology Of Cigarette Laser Code Based On Deep-Learning

Haoran Zhu , Yanbing Liu and Xin Zhang
China Tobacco Guangxi Industrial Co., Ltd., Nanning, Guangxi,China

ACSE 2023
A108

Introduction

Laser codes play an important role in cigarette product tracing and monopoly management. Each cigarette on the market has a "32-bit code segment" printed by laser, consisting of numbers and letters, containing various information such as the manufacturer, retailer, logistics and distribution. Due to the unstable posture of the sorting line conveyor belt during the coding process and the different background patterns on each cigarette pack, a large number of laser codes are difficult to recognize quickly with the naked eye due to the complexity of the background patterns.

The accuracy of character recognition of 32-bit cigarette codes varies greatly due to the different printing substrates of different brands, and it is difficult for manual inspection and recognition of irregular patterns such as hot stamping and color patterns on packaging printing materials. Traditional image processing methods are difficult to overcome the technical difficulties of slow product recognition, low efficiency, and lack of digital expert models.[1-4]

This study uses the YOLO network to quickly and accurately identify 32-bit laser codes.

Experimental results show that the method proposed in this paper can effectively convert image data in the intelligent recognition system of cigarette laser codes into text information, thereby improving the work efficiency of tobacco-related personnel and the automation level of tobacco information entry business.

Methods

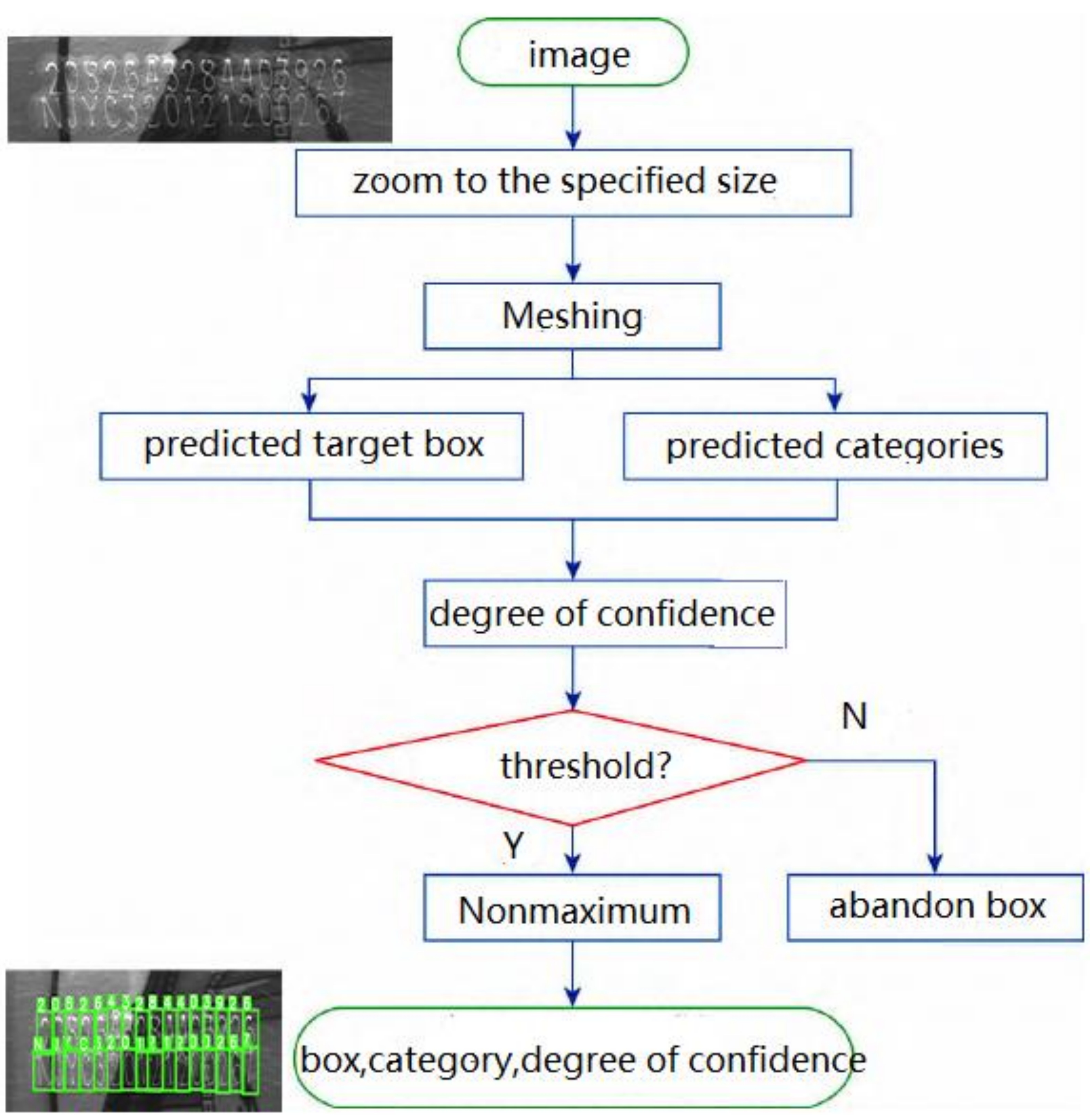

Figure 1. laser code character recognition process with YOLO

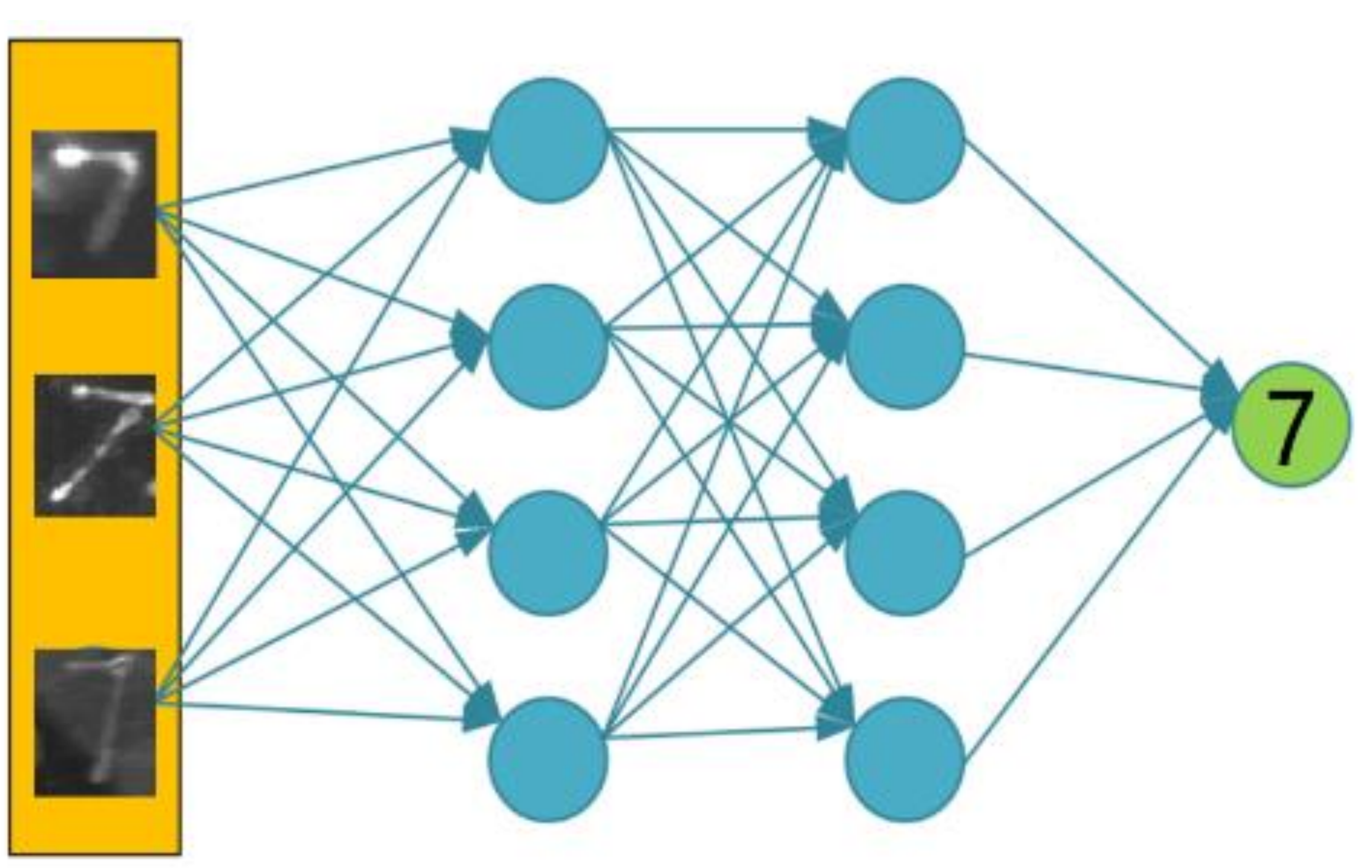

Figure 2. The self-variation characteristic of code value

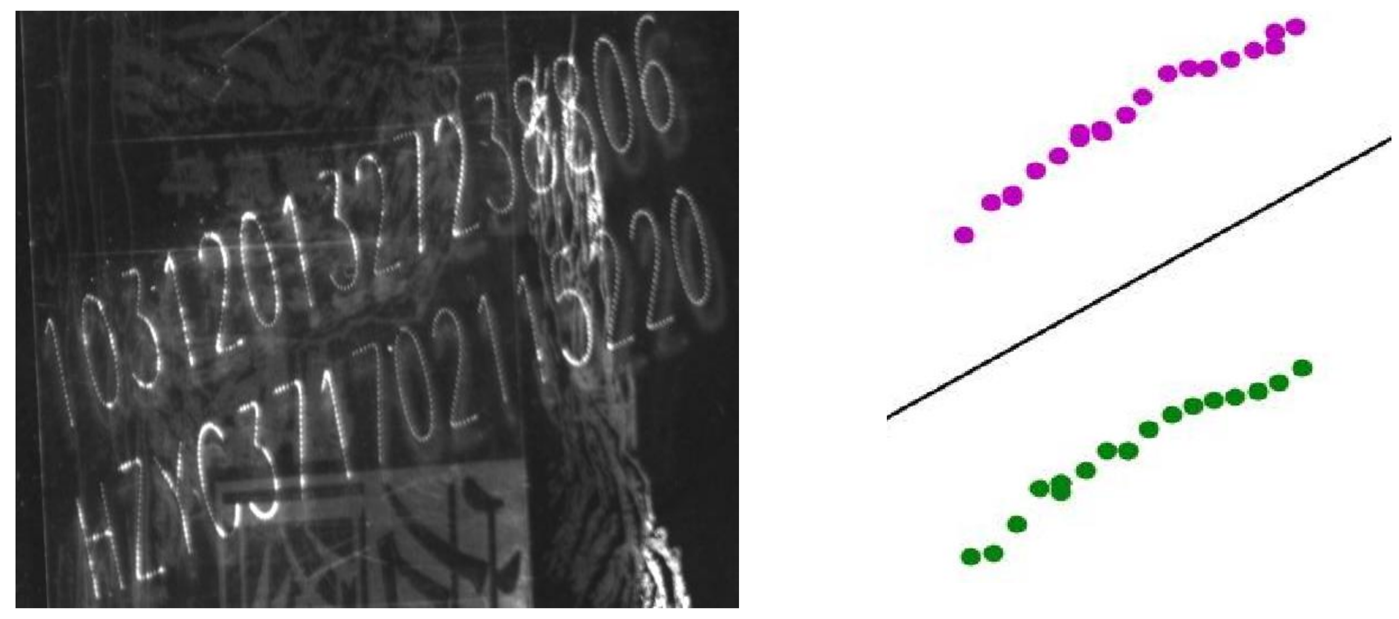

Figure 3. Comparison of Original and Processed Images

Results and discussion

This project uses the collected data training set, which includes 500 detection images and 16,000 recognition images of Chinese documents. After dividing the dataset, training was performed, and the training results are shown in the following figure.

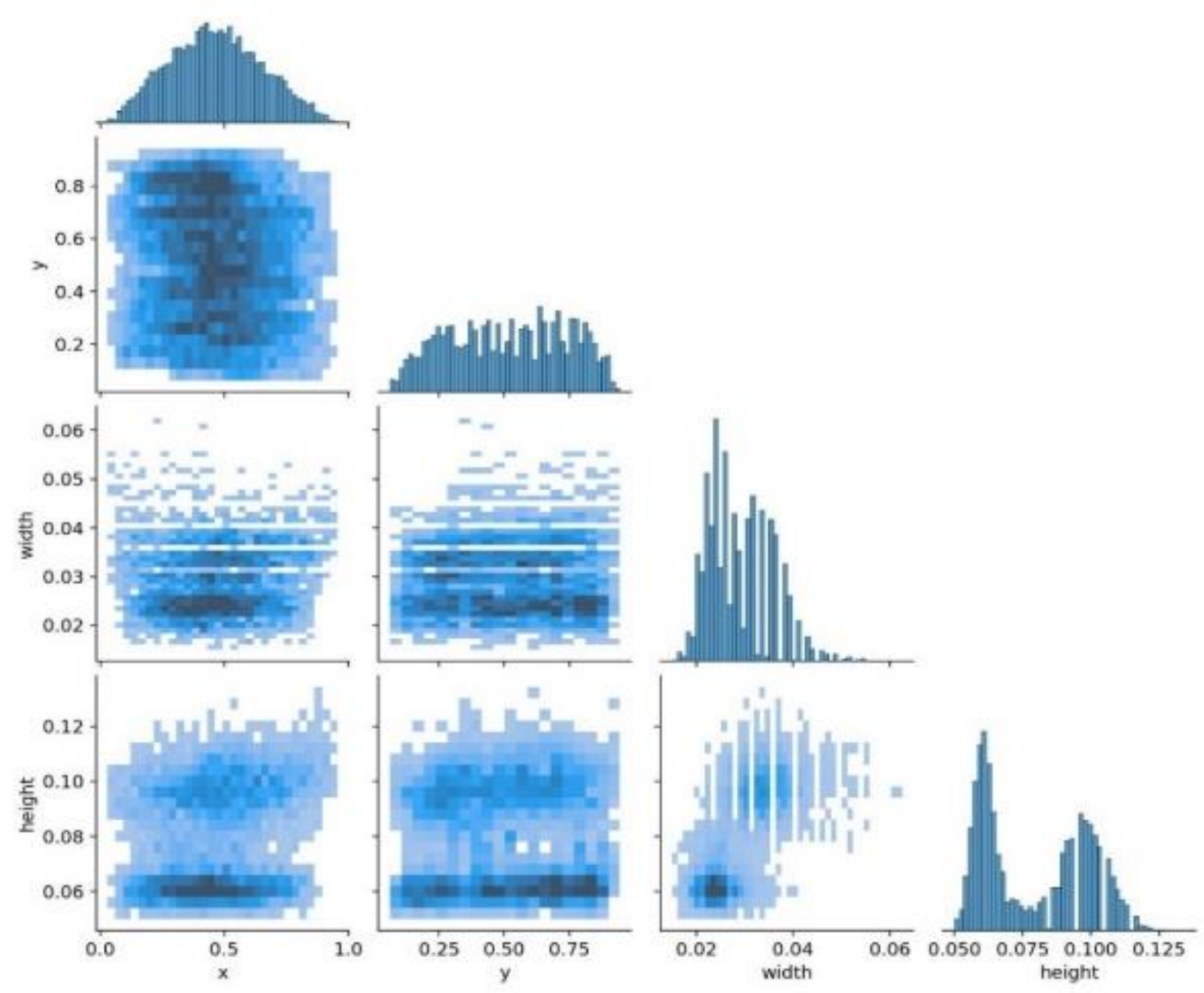

Figure 4. Statistics of labels

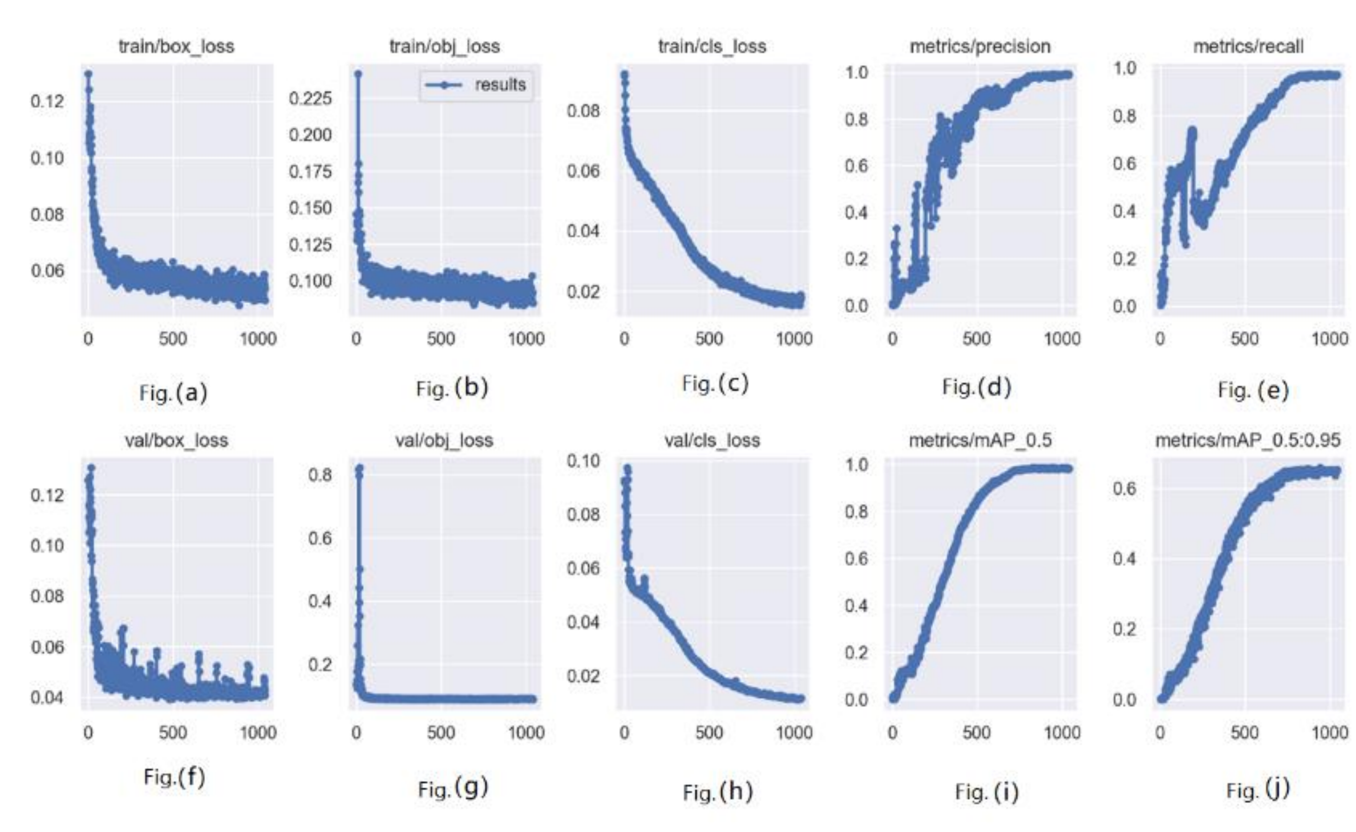

Figure 5. Results of training

References

[1] Buta M, Neumann L, Matas J. FASText: efficient unconstrained scene text detector[C]//Proc of IEEE International Conference on Computer Vision. Piscataway, NJ: IEEE Press,2015:1206-1214.4

[2] He Pan, Huang Weilin, Qiao Yu, et al. Reading scene text in deep convolutional sequences [C]//Proc of the 30th Conference on Artificial Intelligence. Palo Alto: AAAI Press, 2016:3501-3508.

[3] Huang Weilin, Qiao Yu, Tang Xiao'ou. Robust scene text detection with convolution neural network induced MSER trees [C], Proc of thel3th European Conference on Computer Vision. Berlin: Springer, 2014:497-511.4