Computer vision based coin counter using DL

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Outline

- Motivation
- Solution
- Architecture
- Dataset
- Experimental method
- Evaluation metric

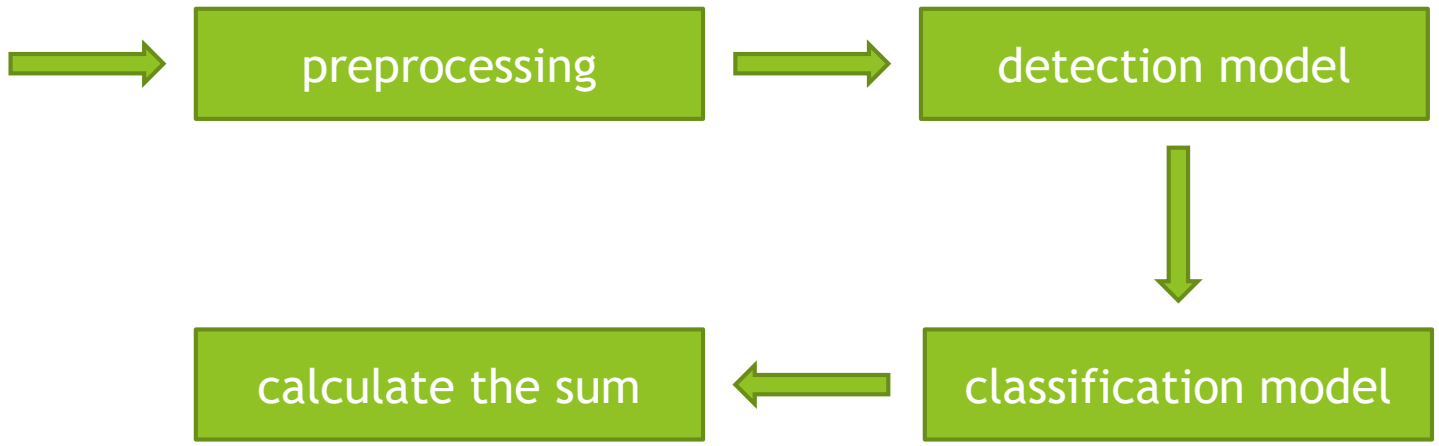
Motivation

- There are many retail markets in Taiwan that use change or banknotes for transactions.
- If the customer uses a lot of change to pay, it will cause trouble for the cashier.

Solution

- Use detection model and classification model to automatically calculate the total amount of change.

Architecture

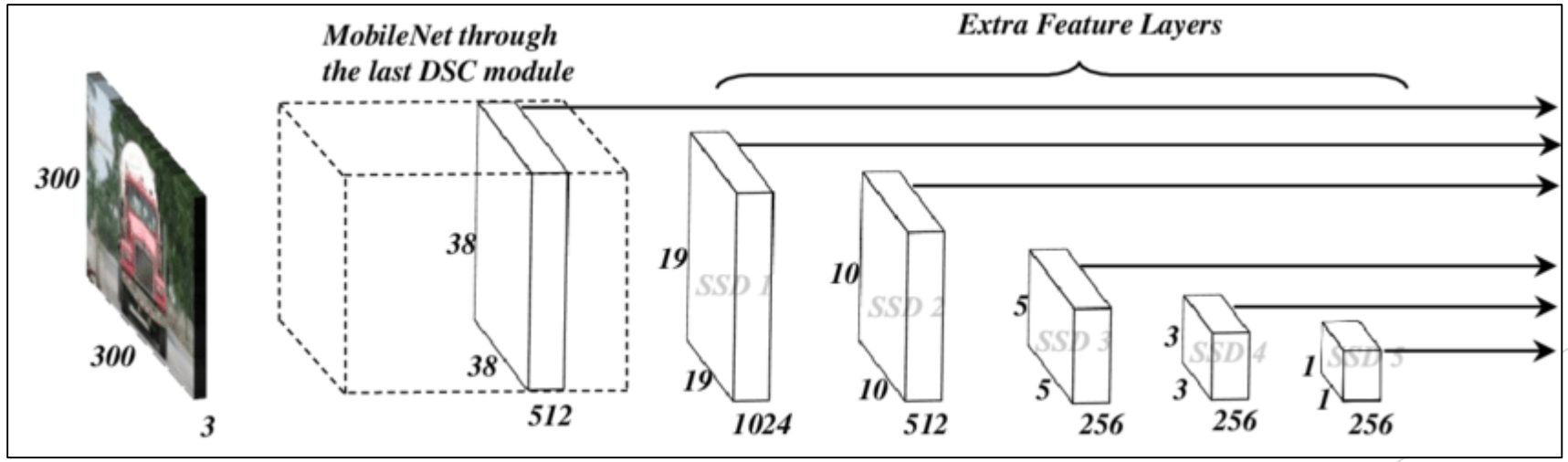


Dataset

- Use own labeled dataset
  - Training set
  - Validation set
  - Test set

Experimental method

- Detection model
  - SSD (Single Shot MultiBox Detector)
  - lightweight backbones (ImageNet pretrained weight)
    - MobileNet V2



Experimental method

- Classification model
  - lightweight networks (ImageNet pretrained weight)
    - MobileNet V2
  - common used network (ImageNet pretrained weight)
    - ResNet-50
  - compare the results (speed, accuracy)

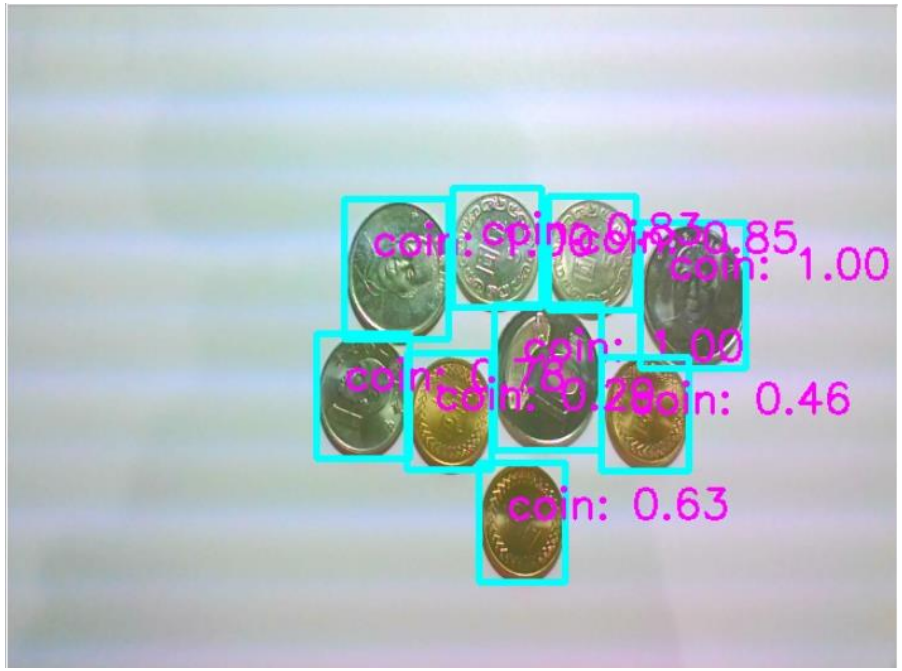
Evaluation metric

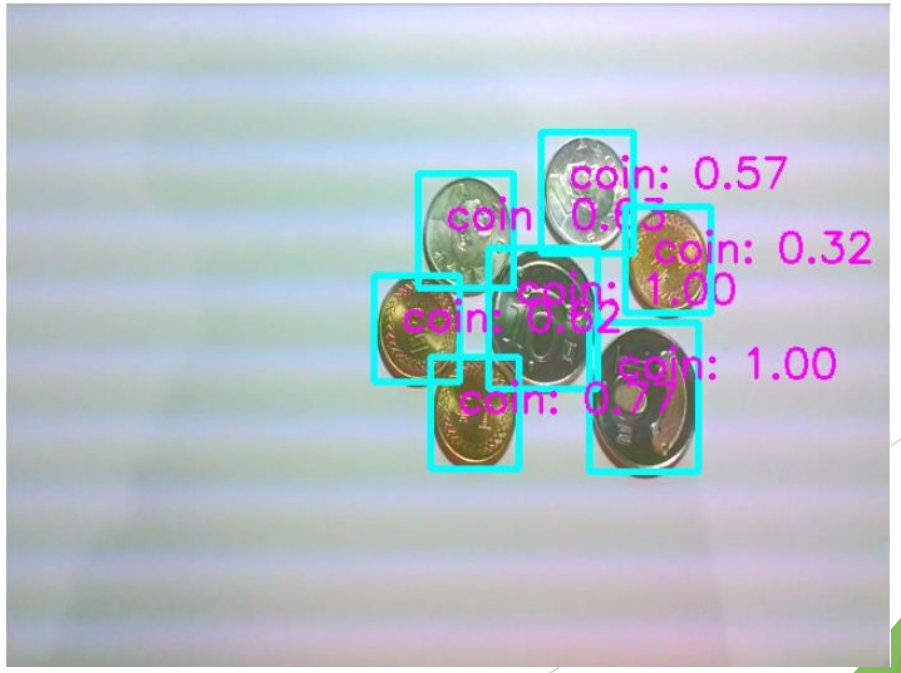
- Average Precision(AP)
- Classification accuracy

Experiment results

- Object detector

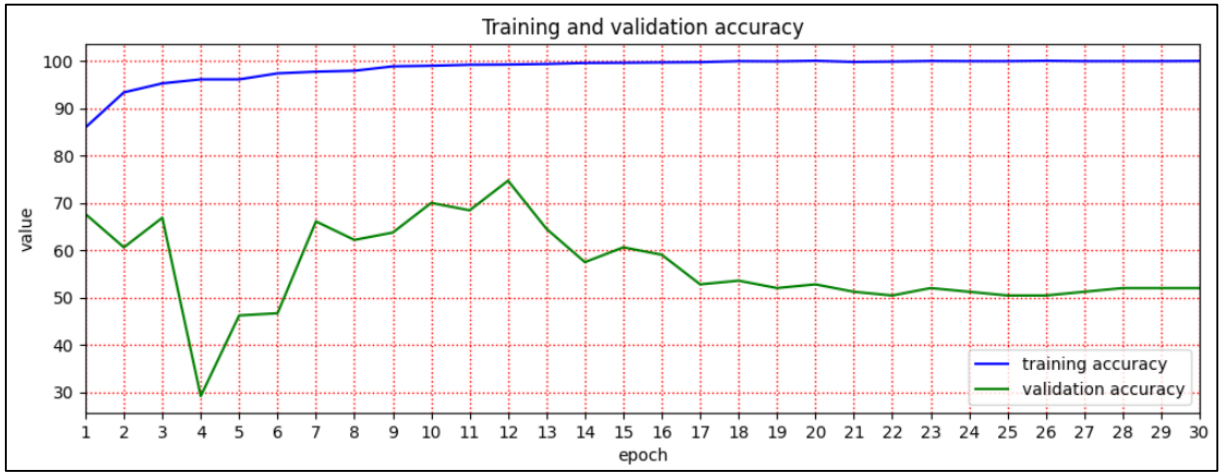
	AP[IoU=0.5]	AP[IoU=0.7]	AP[IoU=0.9]
Mobilenetv2_ssdlite	1.0	1.0	0.736





Experiment results

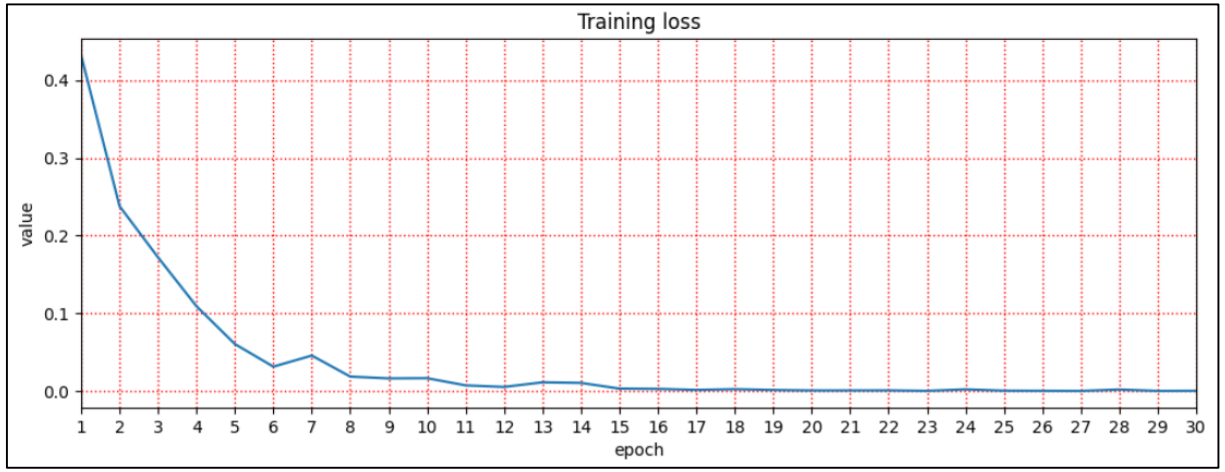
- Classifier(MobileNet-V2)

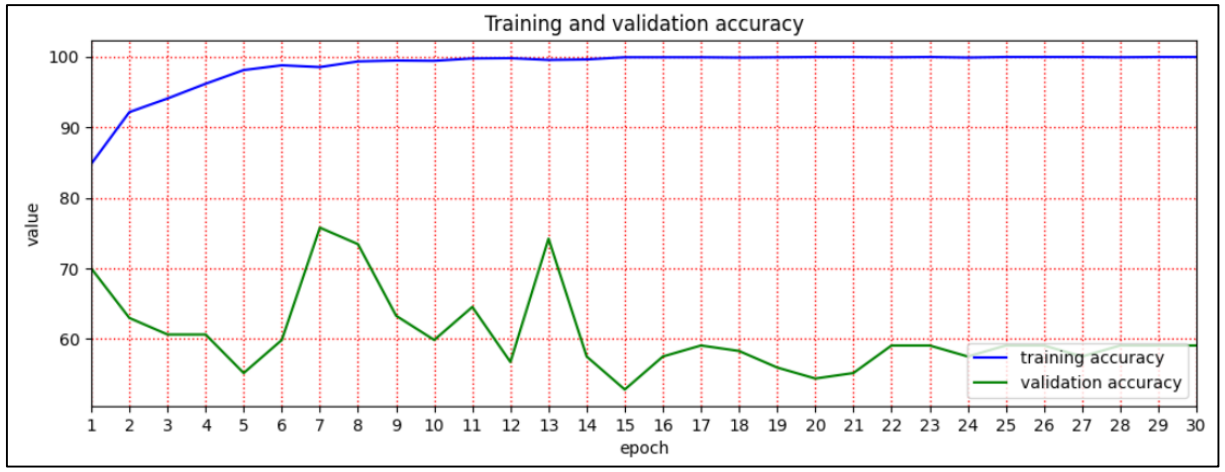


Accuracy of coin1: 100.0 %
Accuracy of coin5: 100.0 %
Accuracy of coin10: 100.0 %
Accuracy of coin50: 100.0 %
Accuracy of the network on all test set: 100.0 %

Experiment results

- Classifier(ResNet-50)

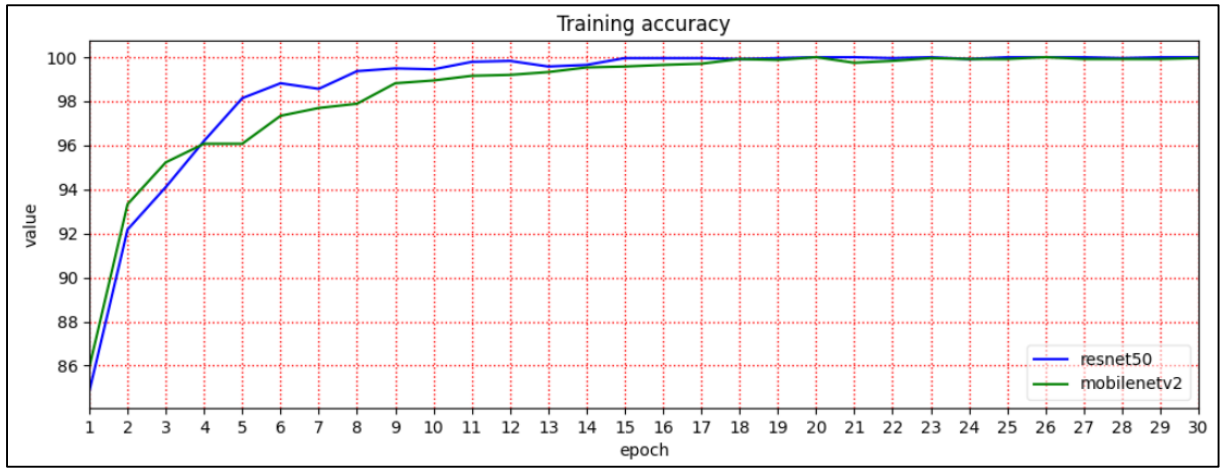


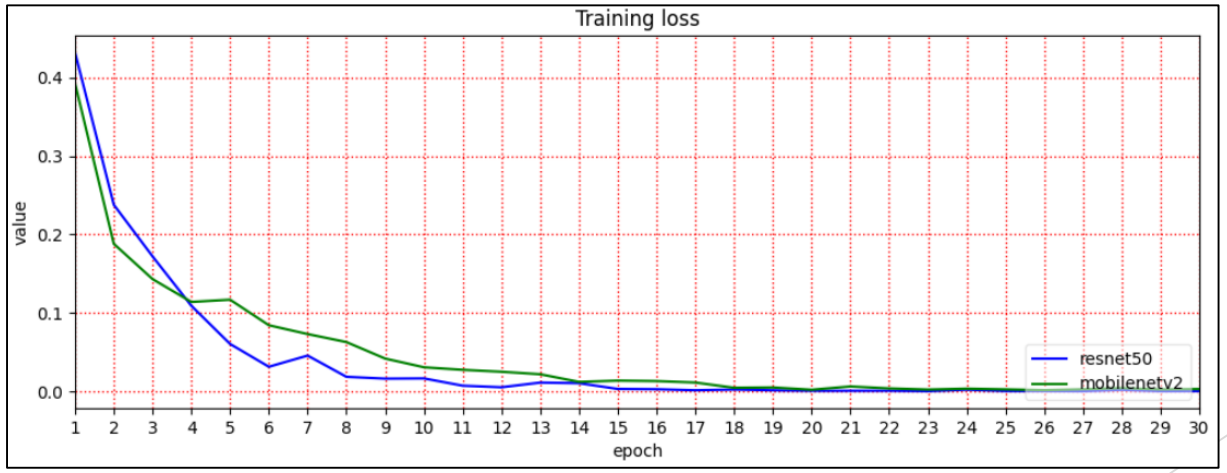


Accuracy of coin1: 100.0 %
Accuracy of coin5: 100.0 %
Accuracy of coin10: 100.0 %
Accuracy of coin50: 100.0 %
Accuracy of the network on all test set: 100.0 %

Experiment results

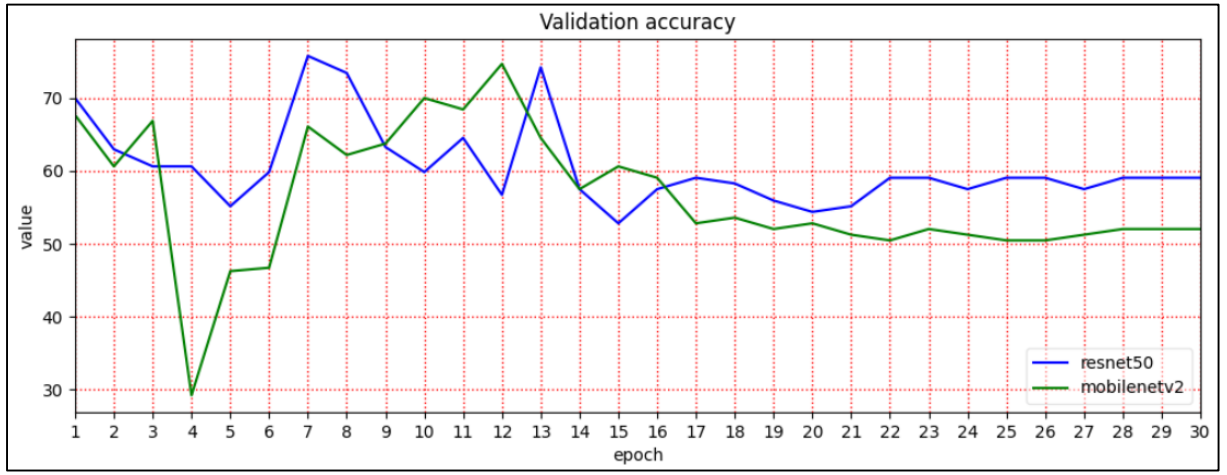
- Comparison





Experiment results

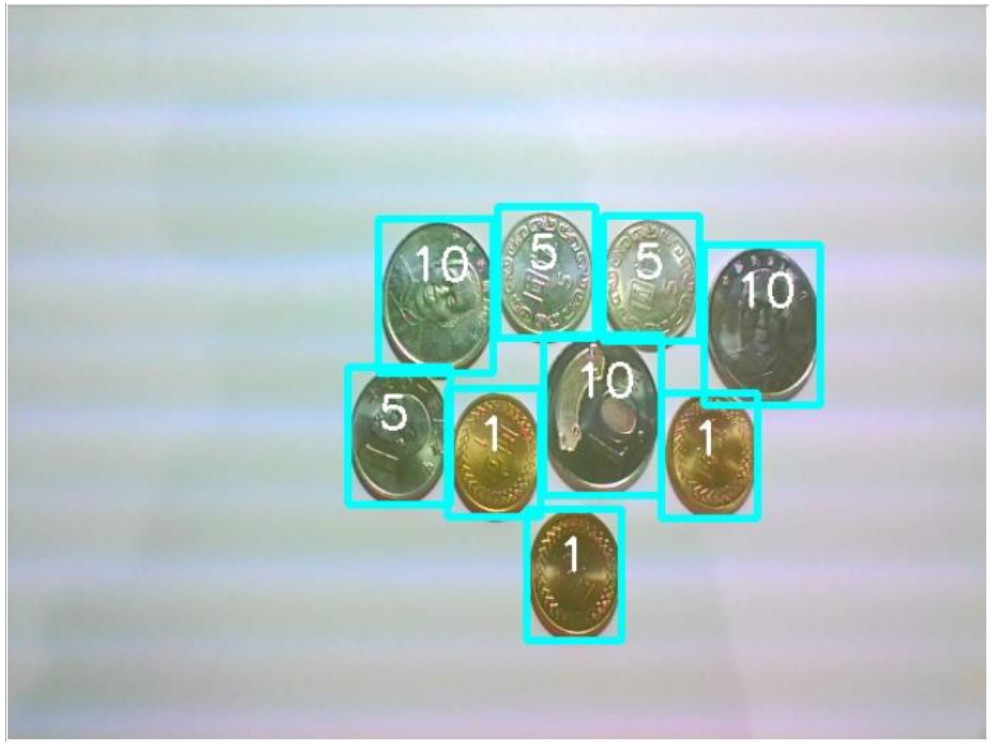
- Comparison



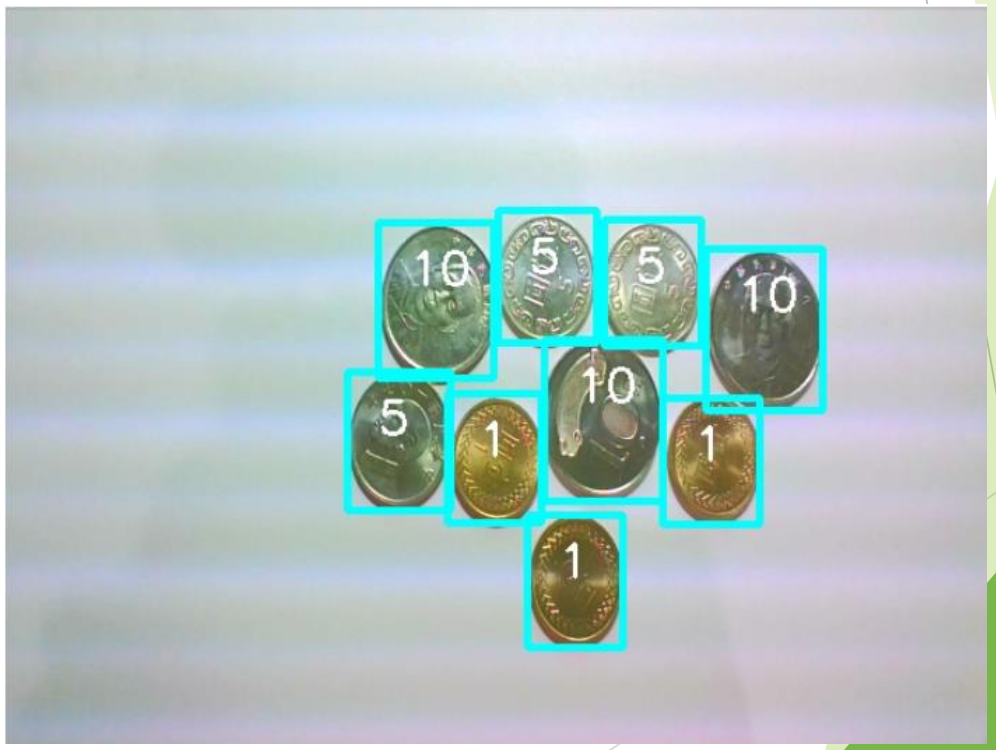
Experiment results

- Comparison

MobileNet-v2 classifier



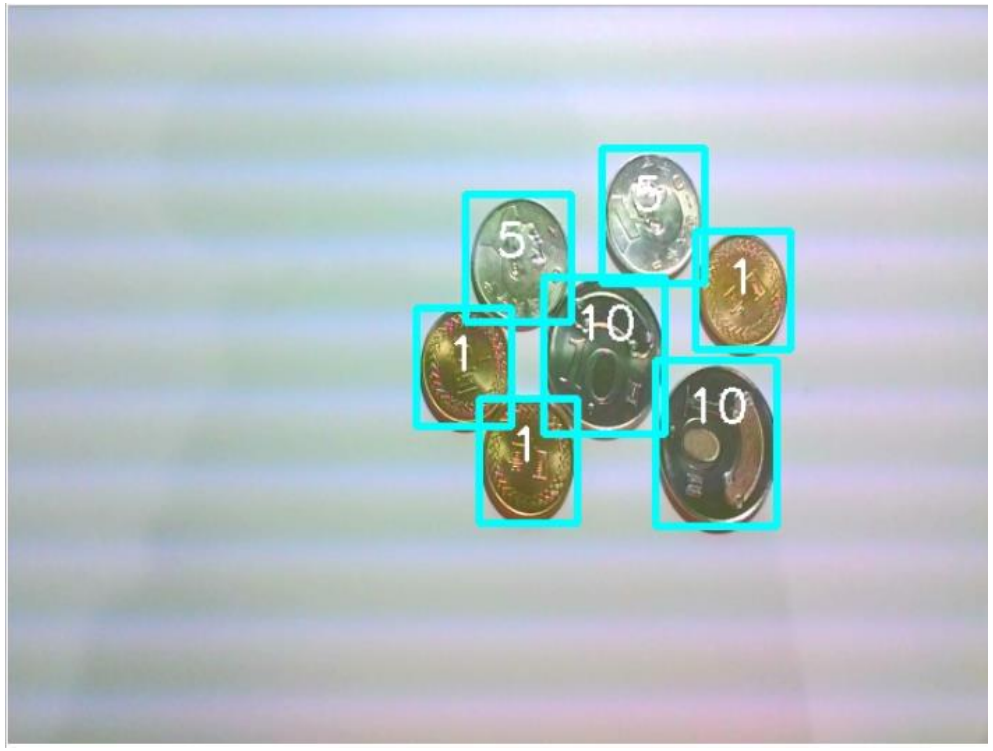
ResNet-50 classifier



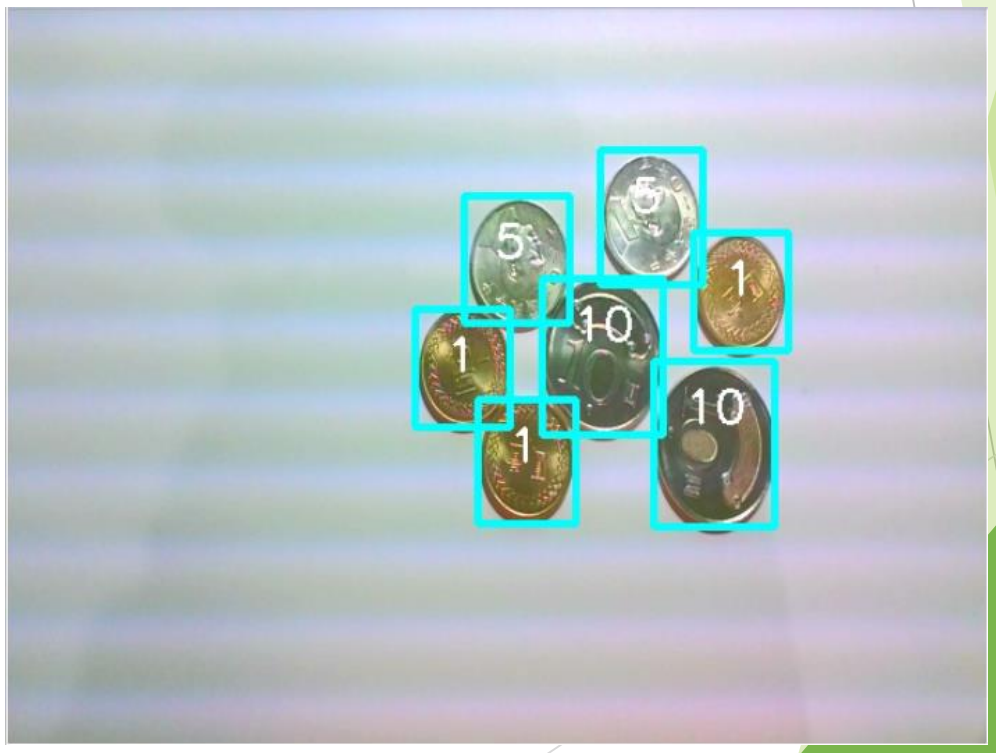
Experiment results

- Comparison

MobileNet-v2 classifier



ResNet-50 classifier



Experiment results

- Comparison

MobileNet-v2 classifier

ResNet-50 classifier

Experiment results

- Comparison

	Cost time
MobileNet-v2 classifier	1.2 s
ResNet-50 classifier	2.9 s

Thank you for listening