領先創新•
•超越自我

2019 Synopsys ARC盃電子設計競賽

Electronic Component Defect Detection

電子元件的瑕疵檢測

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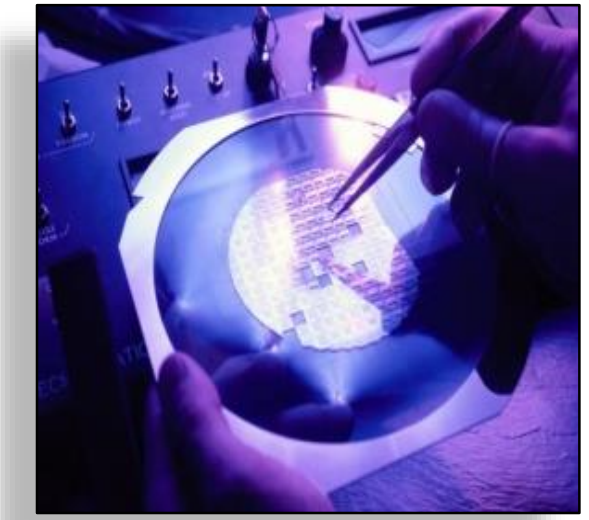
Advisor: Hsie-Chia Chang

Aug. 27, 2019

Agenda

- 項目概述
- 難點與創新
- 設計實現
- 測試結果
- 總結展望



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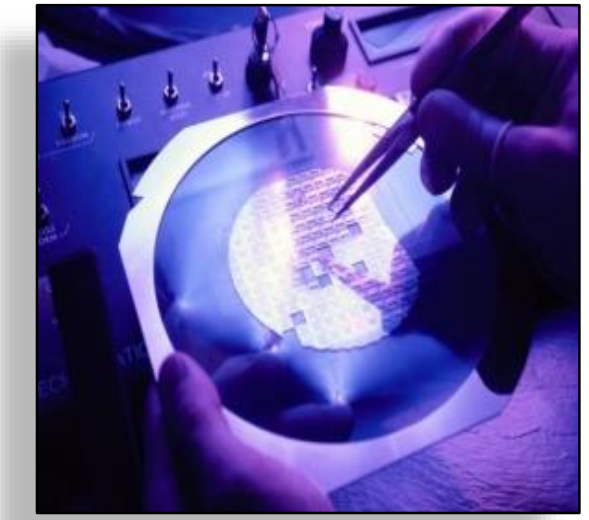
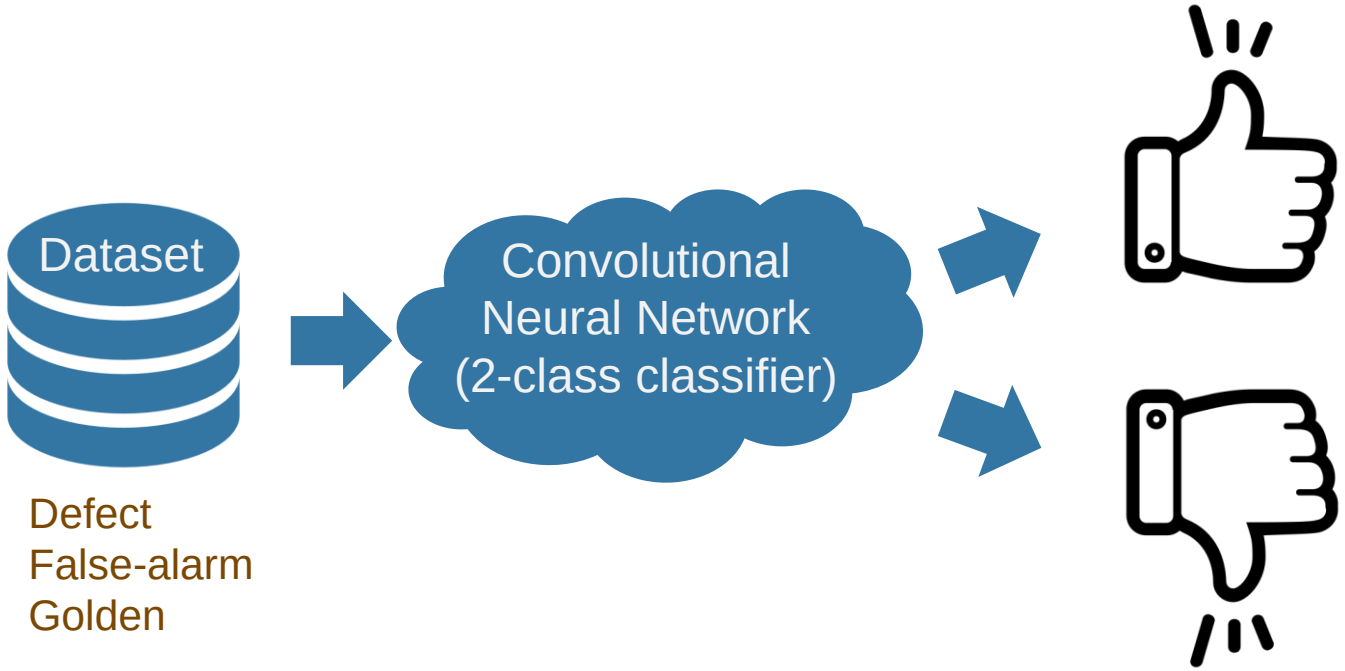


Introduction

- Application
  - Highly accurately classify electronic components into good product and defective product
  - Small convolutional neural network model can be run on IOT Development Kit



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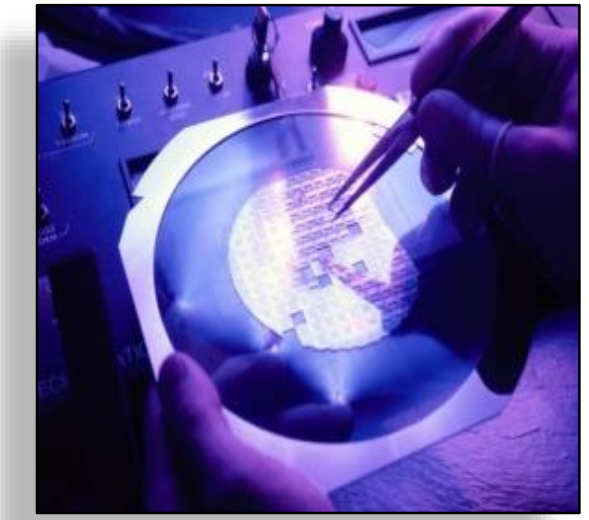

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Challenge and Feature

- Challenge
  - Small amount of data
  - Imbalanced data set

- Feature
  - Classified by machine, replacing human resource
  - Small amount of parameter
  - High accuracy

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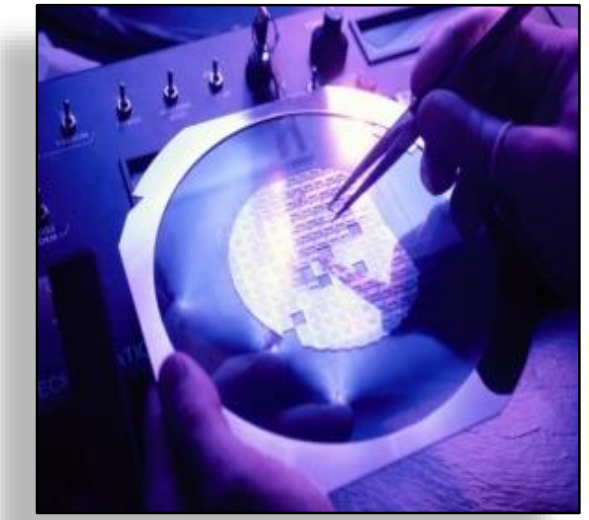

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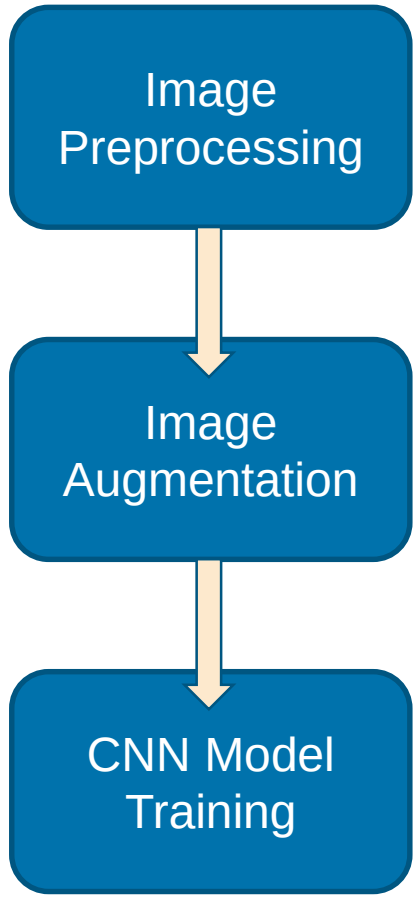
Implementation

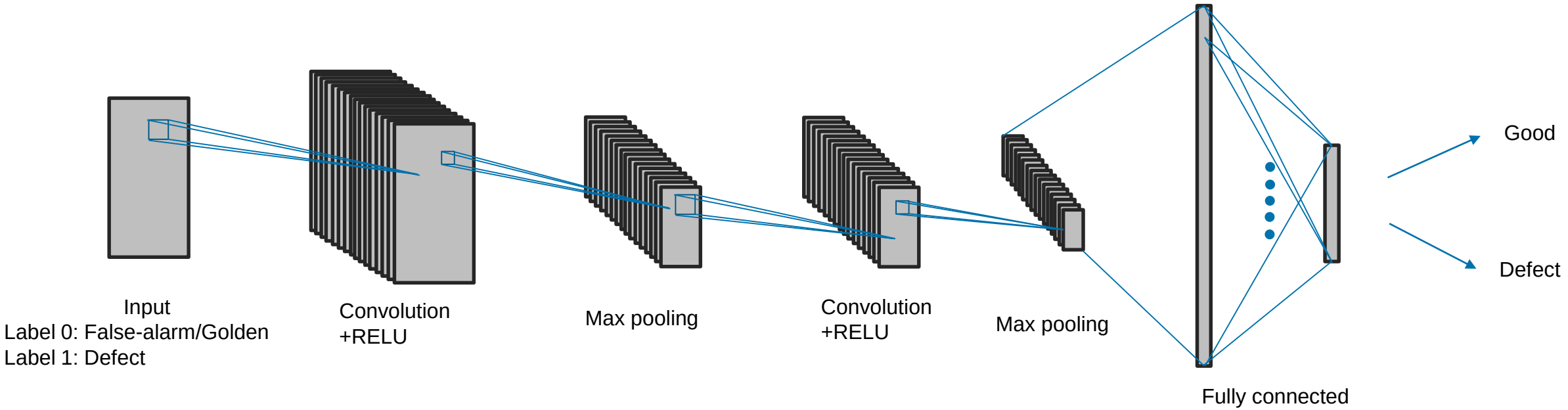
- Image preprocessing
  - Orientation rotation
  - Resizing (40*20)
  - Gray scale (1 color channel)
- Image augmentation
  - Random rotation
  - Add noise
  - Flipping



Implementation

Caffe

- Convolutional neural network



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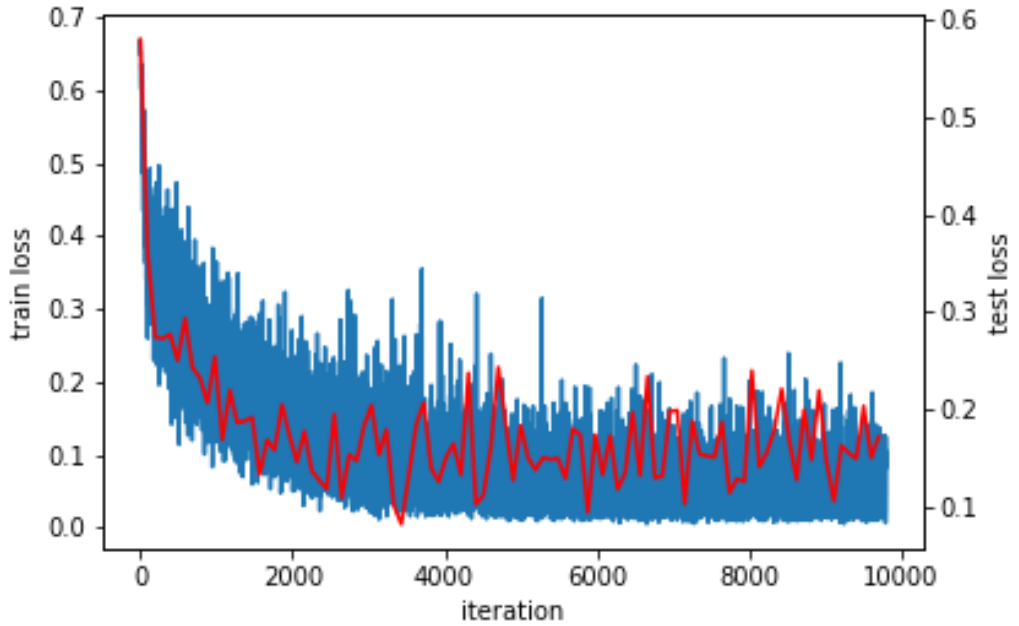
Training Result

- Training time: 48.2s
- Training accuracy: 98.4%



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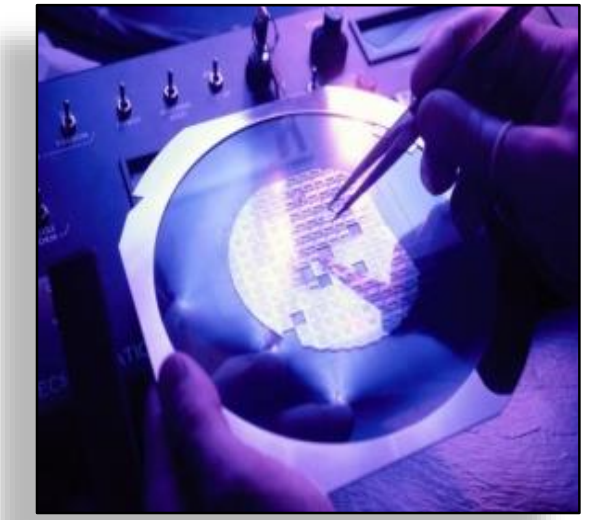

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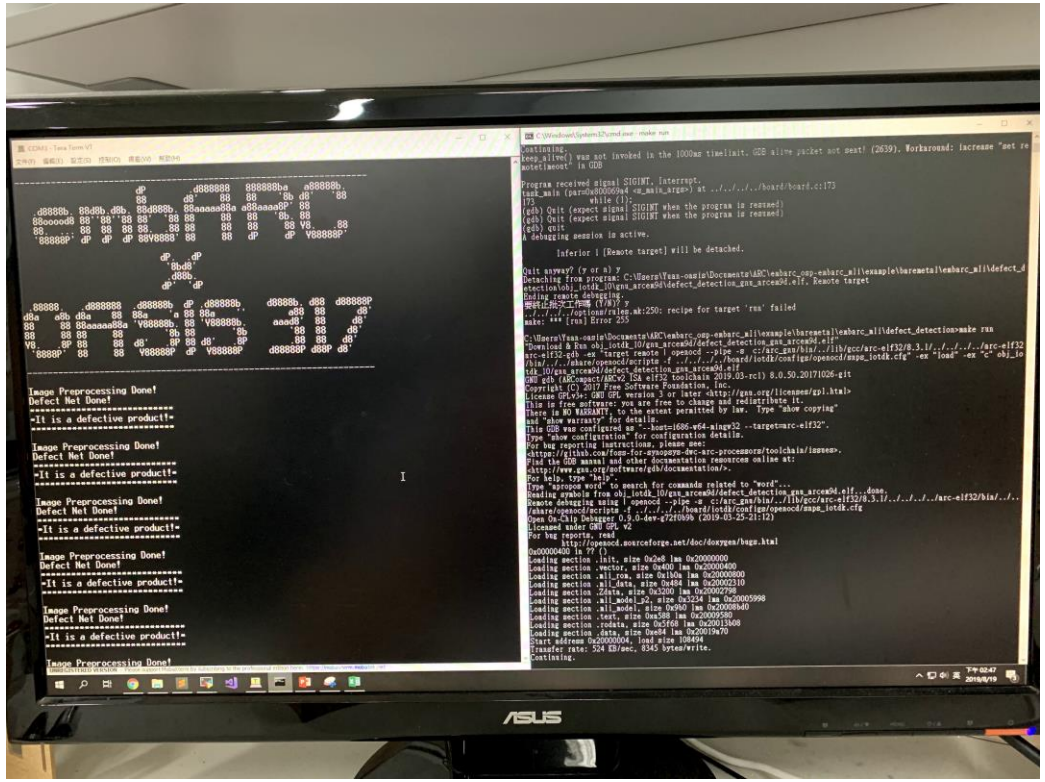
Result

- Accuracy: 82.4%
- Inference time: 8ms/per image



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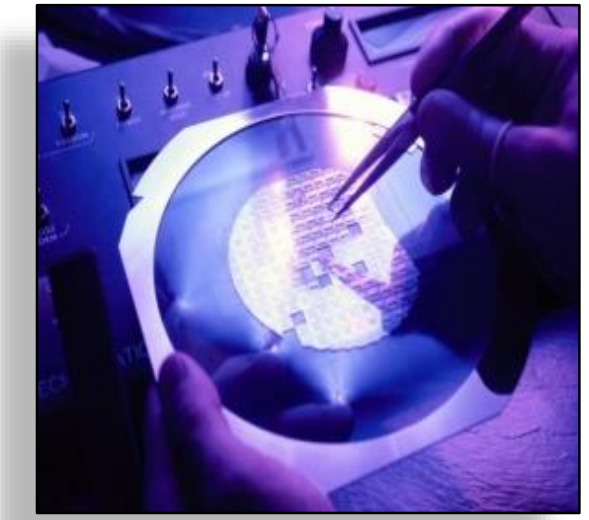

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Future Work and Conclusion

- Future work
  - Real-time defect detection
  - Detect all kinds of electronic component

- Conclusion
  - Small amount of parameter
  - Accuracy is about 82.4% on IOT Development Kit

Thank You