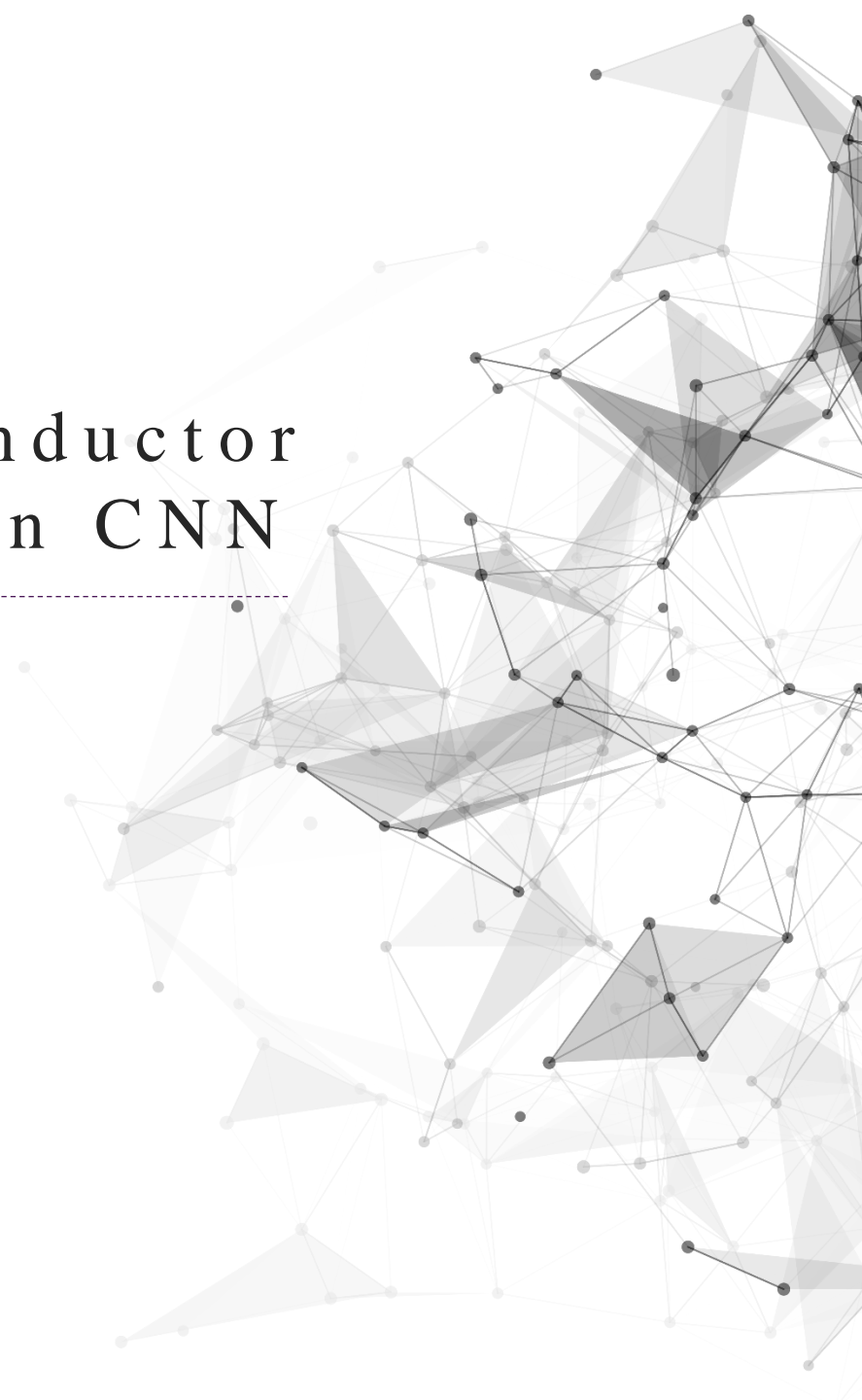


Hotspot Detection of Semiconductor Lithography Circuits Based on CNN

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An abstract geometric design on the left side of the slide. It features a network of thin, light gray lines connecting various black dots of different sizes. Some dots are solid black, while others are hollow circles. The lines and dots form a complex, web-like structure that extends from the bottom left towards the center of the slide. There are also several straight, thin gray lines scattered across the upper left quadrant.

Agenda

1

Introduction

2

CNN Principle

3

Framework

4

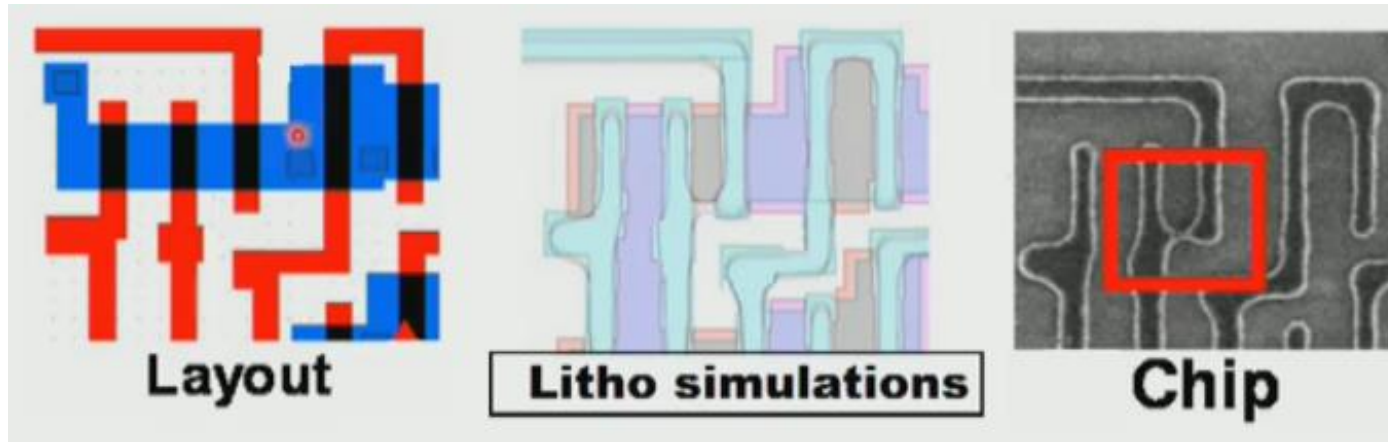
Experiments

5

Conclusion



1. Background Introduction



Node become smaller;
Reason hard to track;
Slow speed

Machine learning?
Deep learning?

Source: Proc. SPIE 10451, Photomask Technology, 104510A

Traditional simulation based defects detection:

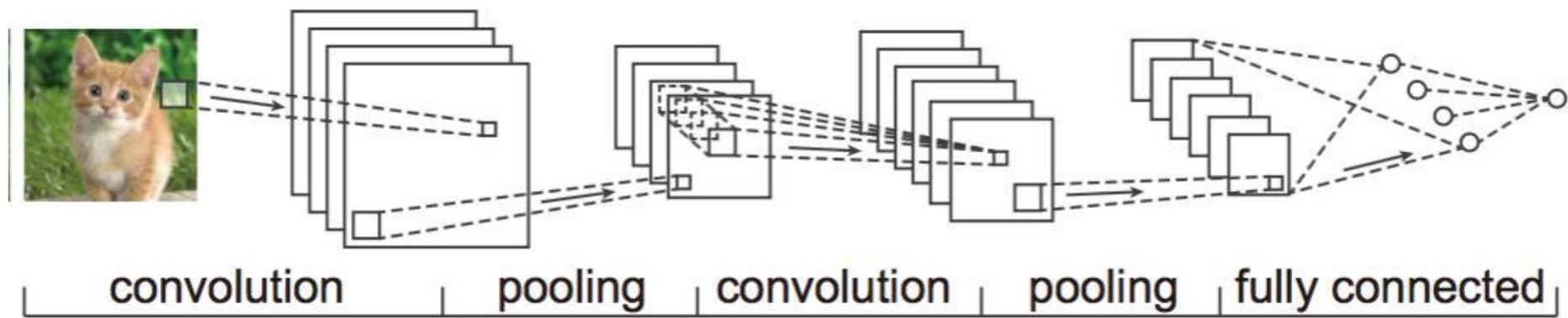
- 1) Slow detection speed.
- 2) Complex algorithms are needed to adapt to different layout.



2. CNN Principle

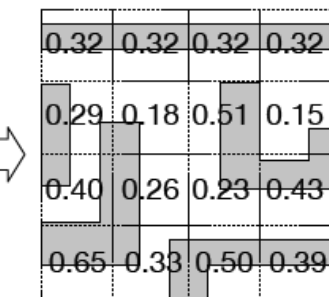
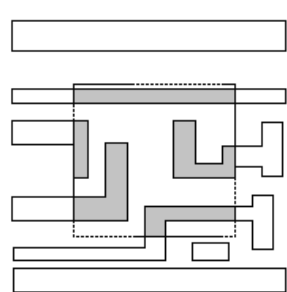
CNN(convolutional neural network) is originally designed to solve the problem of image recognition.

What about Hotspot prediction?

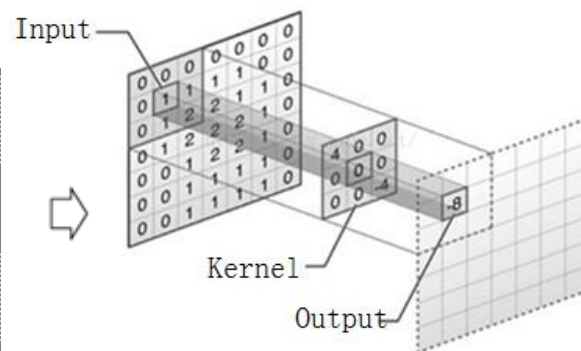
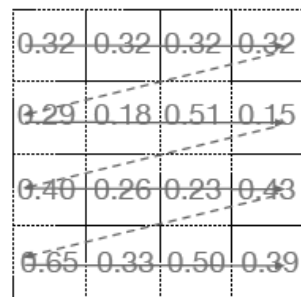




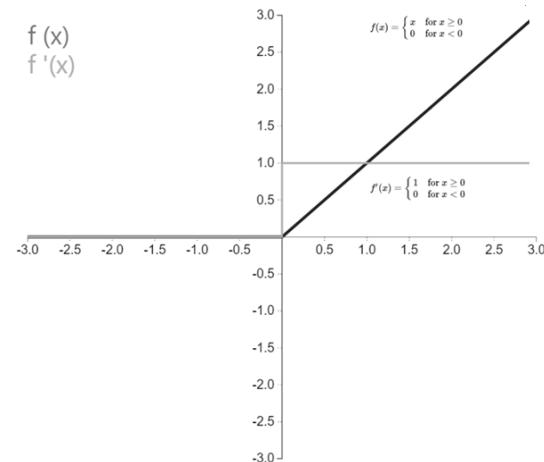
2. CNN Principle



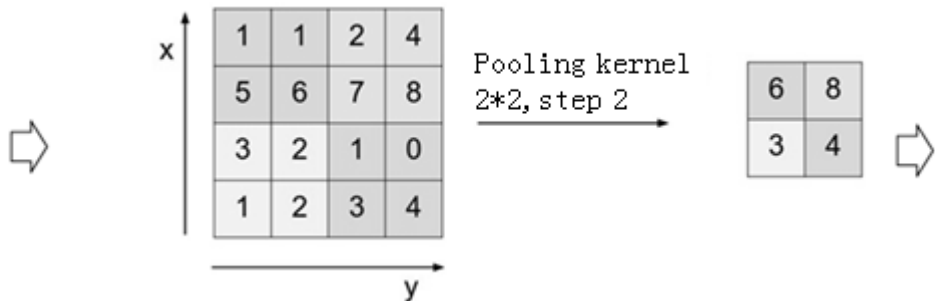
1. Input layer



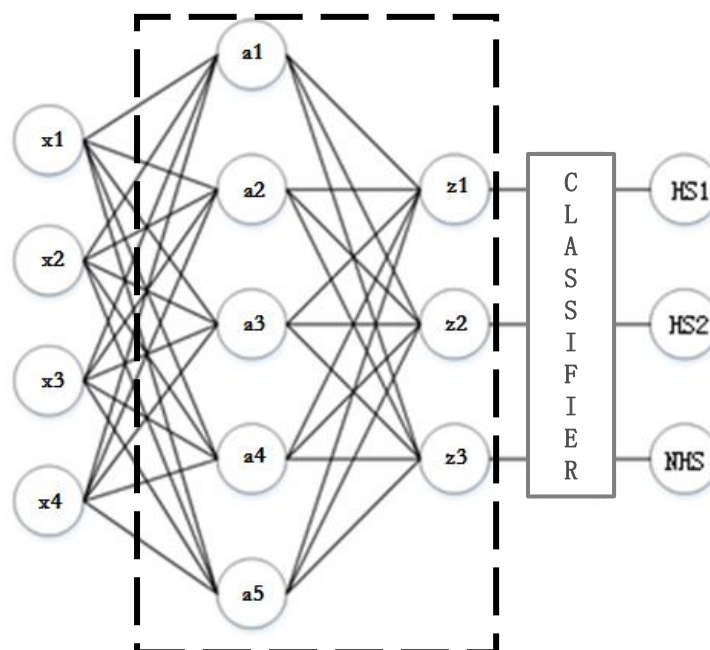
2. Convolutional layer



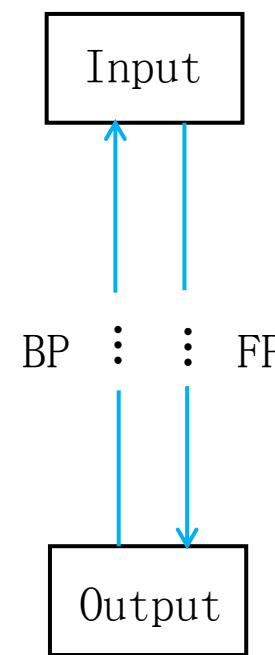
3. Activation Layer



4. Pooling Layer



5. Full connection layer



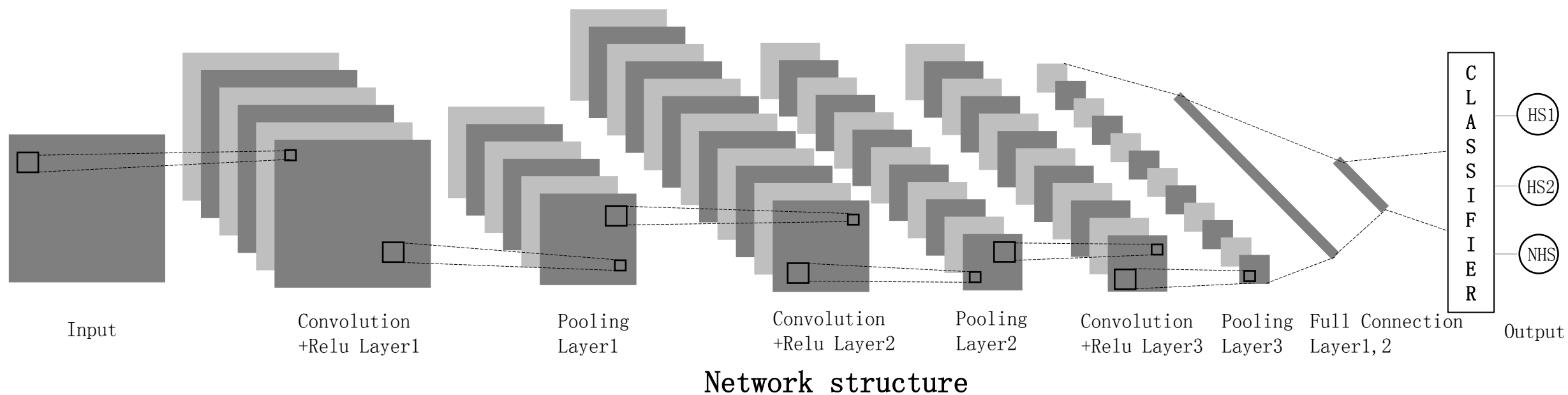


3. Framework

Based on Karas.

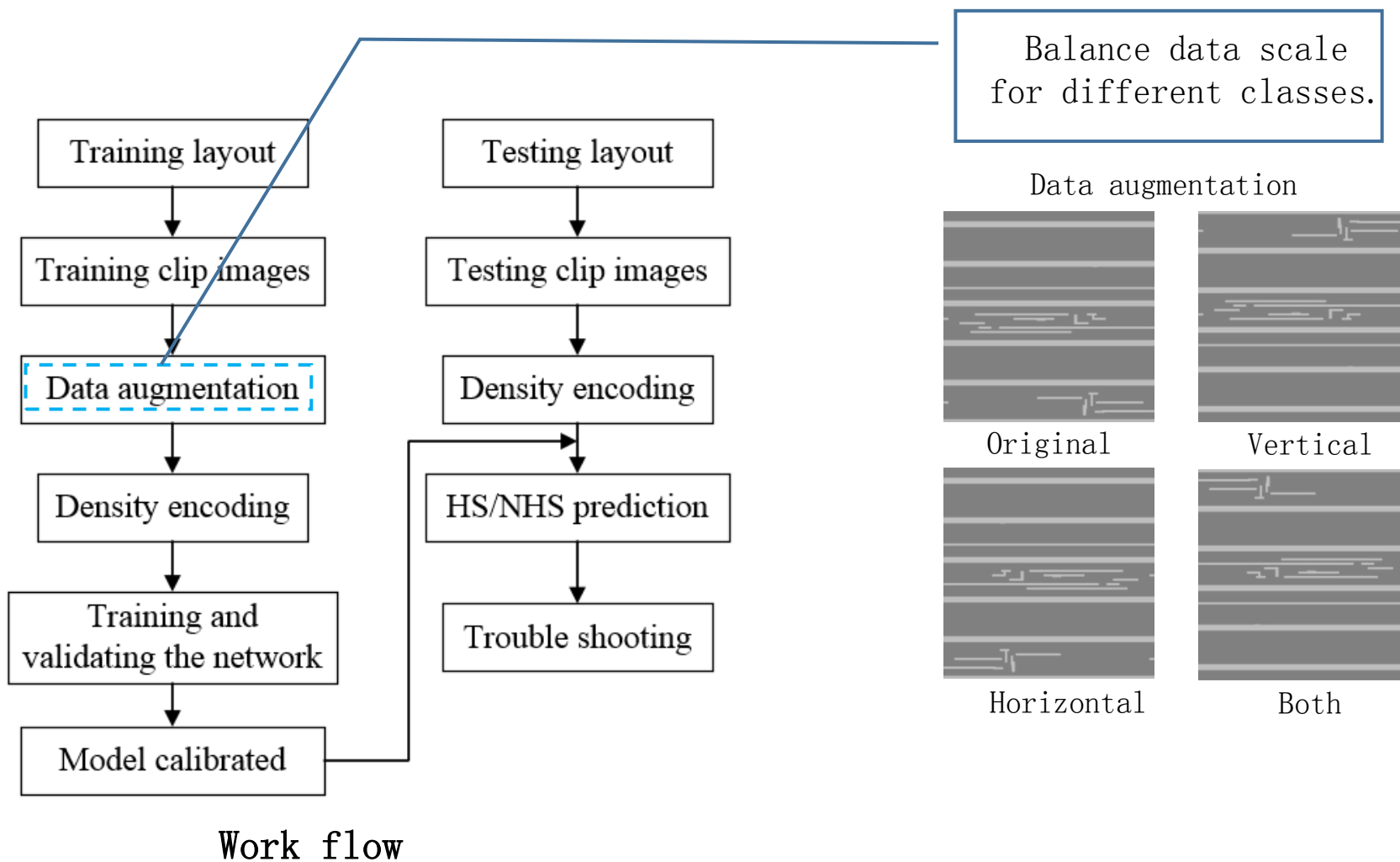
Karas is a deep learning lib.

Highly modularized and extensible.





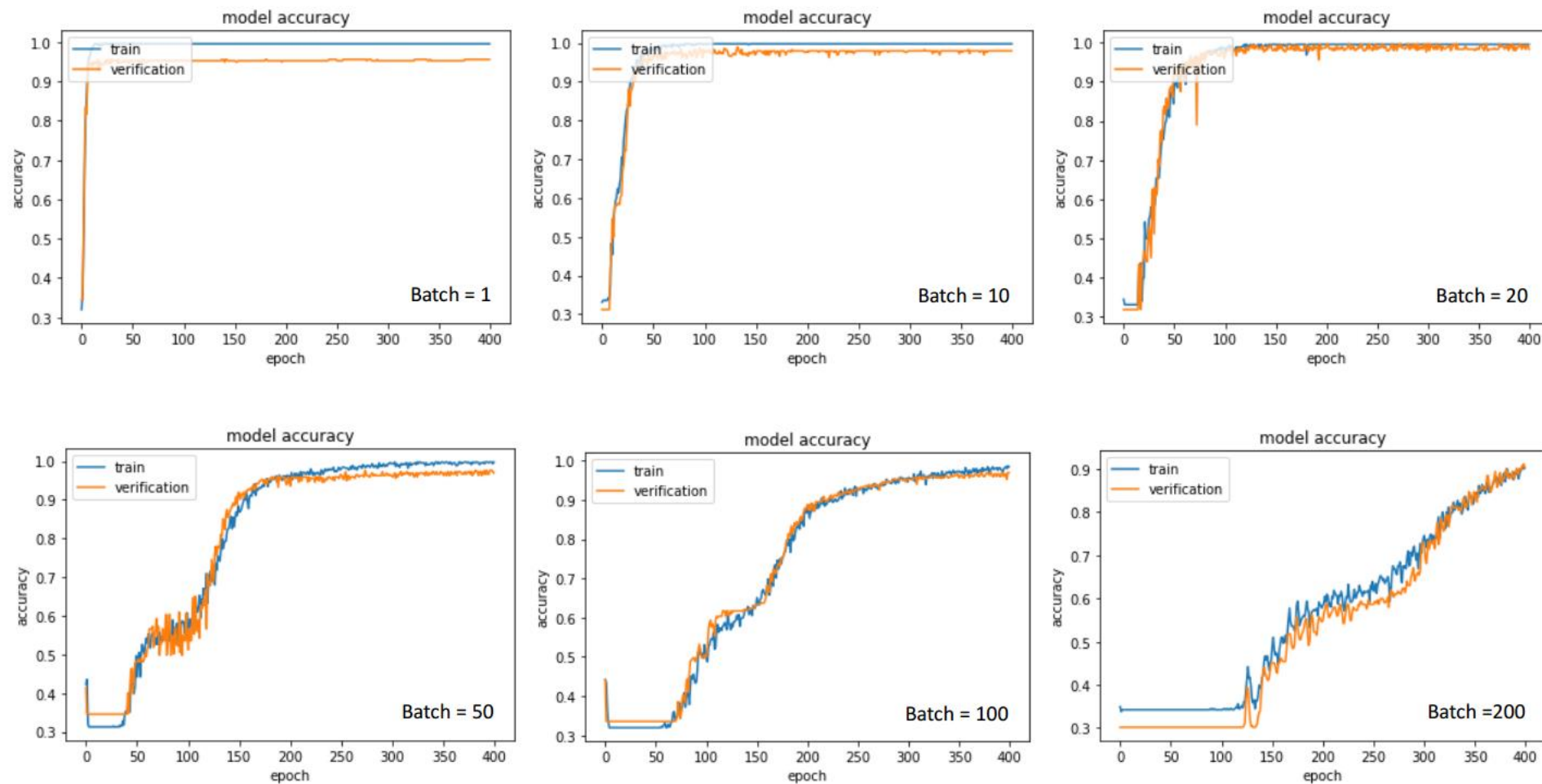
3. Framework





4. Experiments

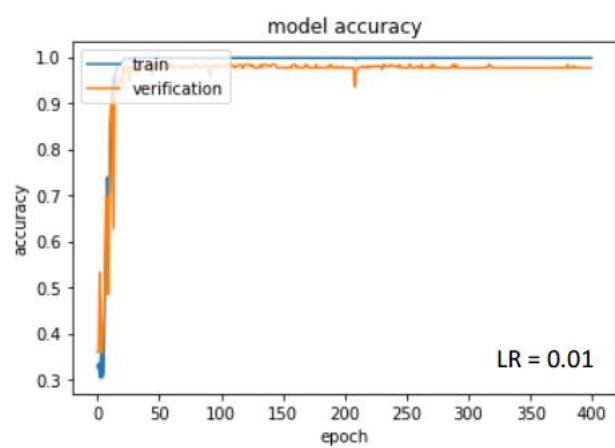
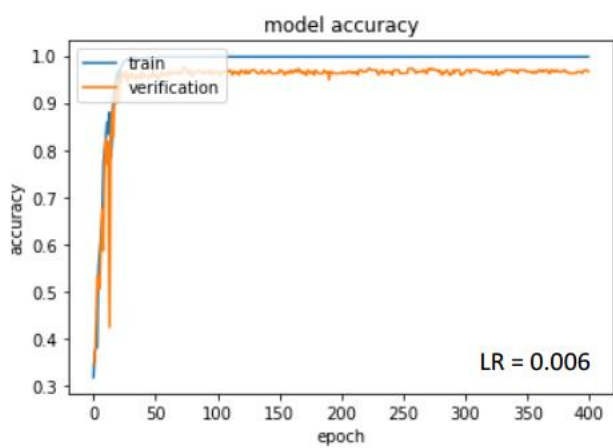
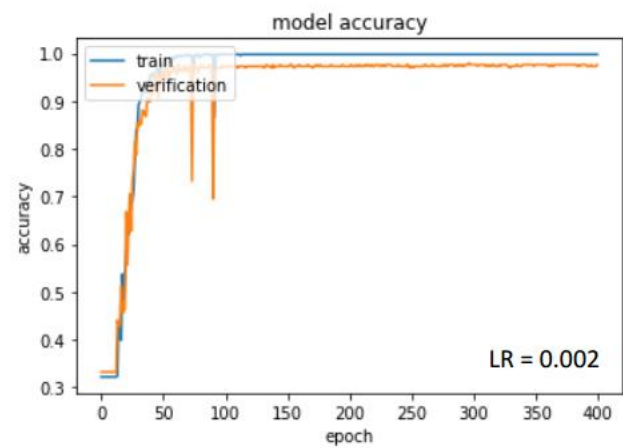
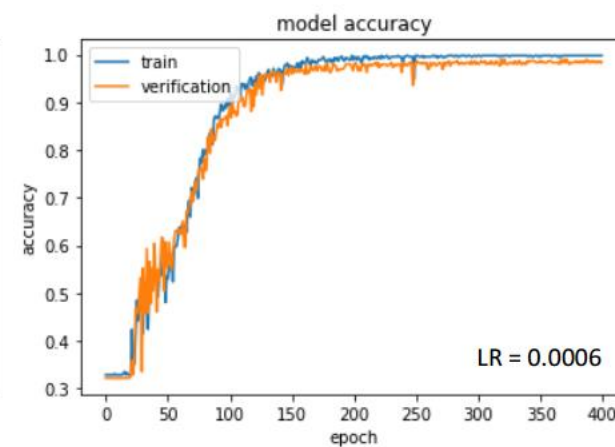
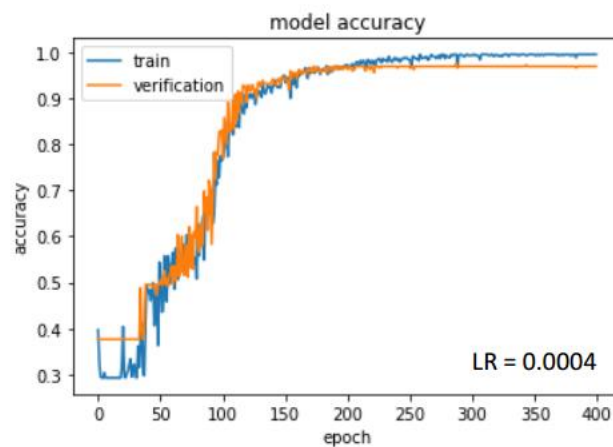
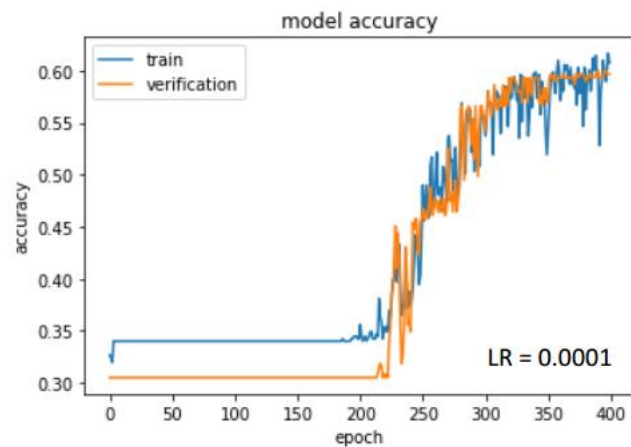
1. Batch size influence





4. Experiments

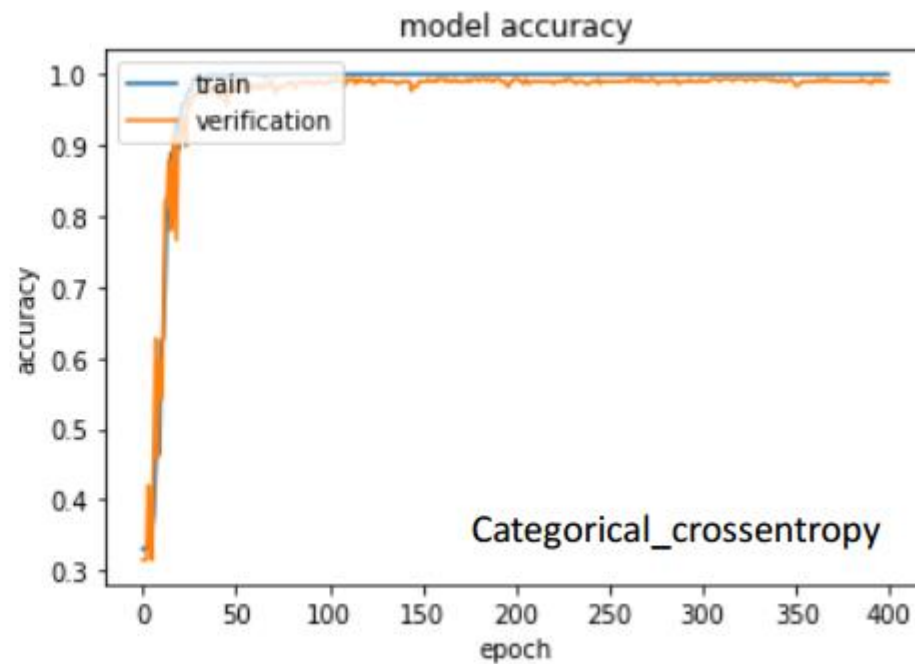
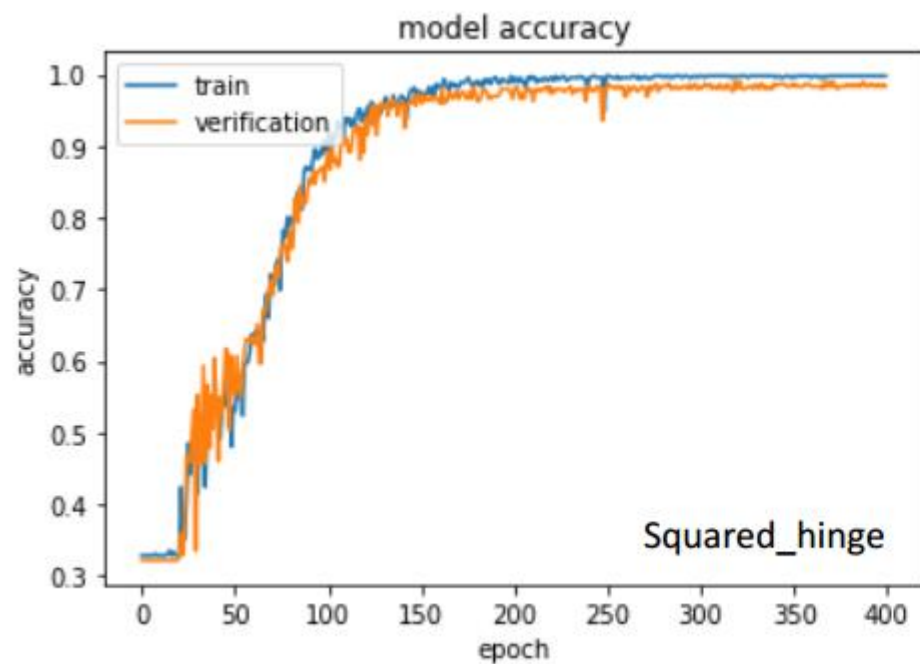
2. Learning rate influence





4. Experiments

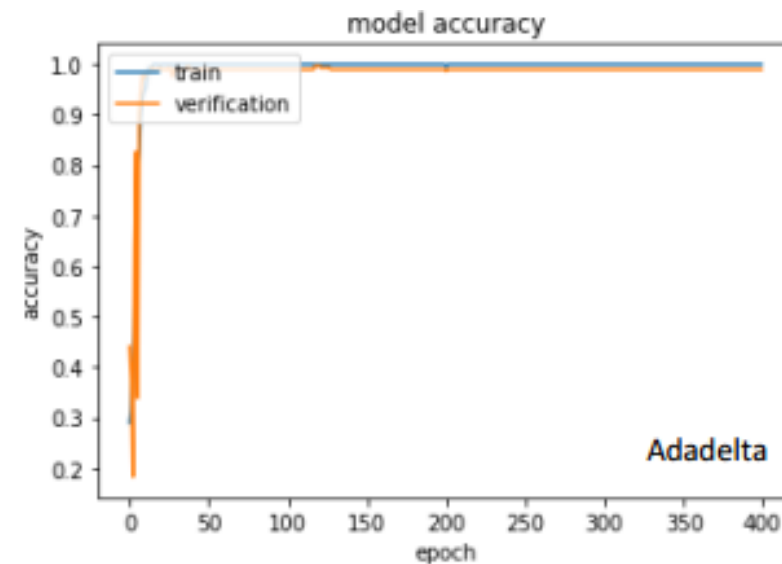
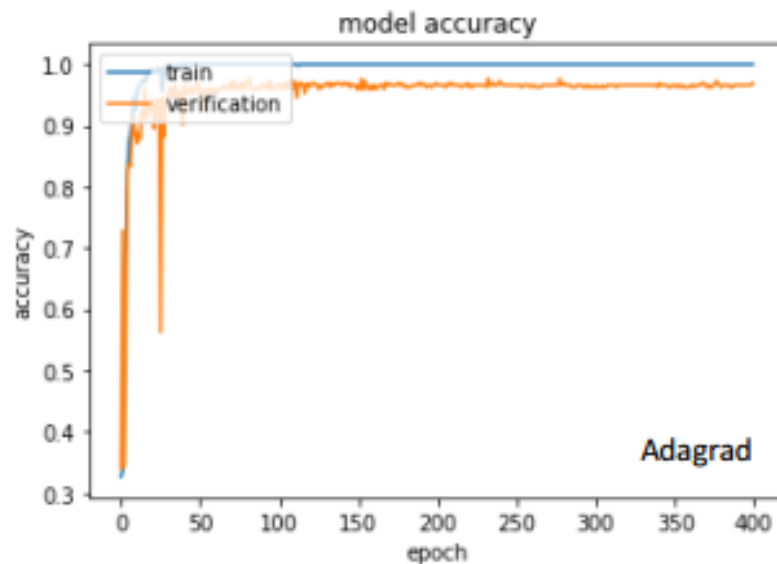
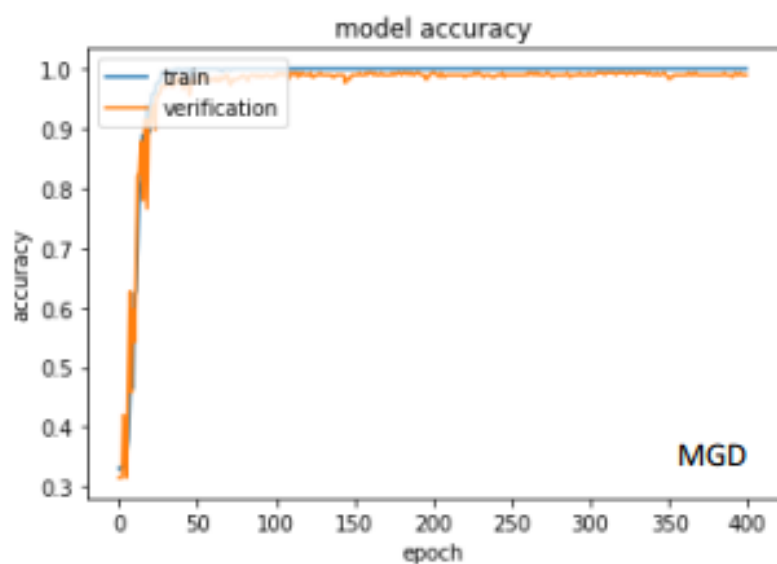
3. Loss function influence





4. Experiments

4. Optimization method influence





5. Conclusion



Start from small network



Tune #epochs and batch size



Tune learning rate



Choose proper loss function and learning method



Thanks