

# 2022 深度學習 作業二 報告

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壹、MNIST 手寫辨識：

A. 程式於附檔 HW002\_1.py

Epoch = 15、Batch = 300、Learning rate = 0.001

模型架構：

```
CNN_Model(  
(cov1): Conv2d(1, 64, kernel_size=(5, 5), stride=(1, 1))  
(relu1): ReLU()  
(maxpool1): MaxPool2d(kernel_size=2, stride=2, padding=0, dilation=1, ceil_mode=False)  
(cov2): Conv2d(64, 16, kernel_size=(7, 7), stride=(1, 1))  
(relu2): ReLU()  
(maxpool2): MaxPool2d(kernel_size=2, stride=2, padding=0, dilation=1, ceil_mode=False)  
(fc1): Linear(in_features=144, out_features=128, bias=True)  
(relu3): ReLU()  
(fc2): Linear(in_features=128, out_features=64, bias=True)  
(relu4): ReLU()  
(fc3): Linear(in_features=64, out_features=10, bias=True))
```

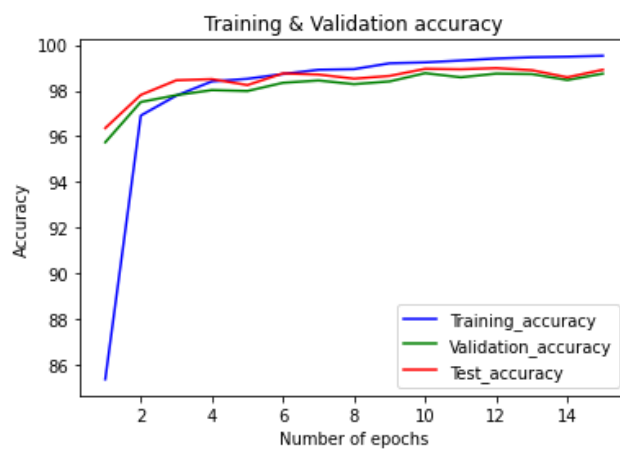
## B. 作業相關圖表

### 1. Learning Curve :

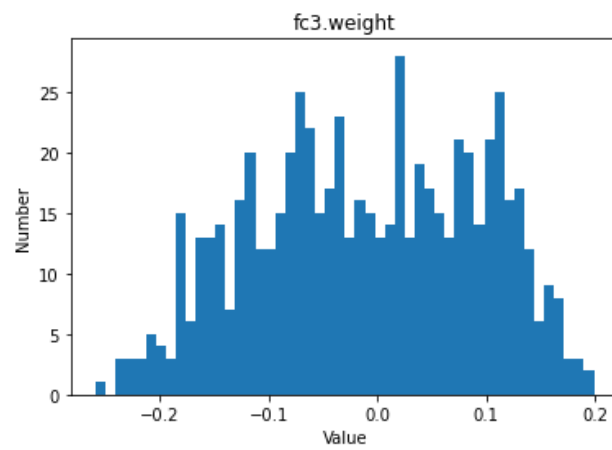
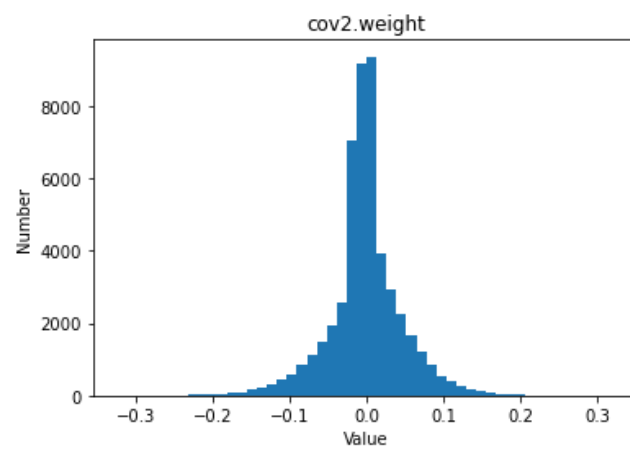
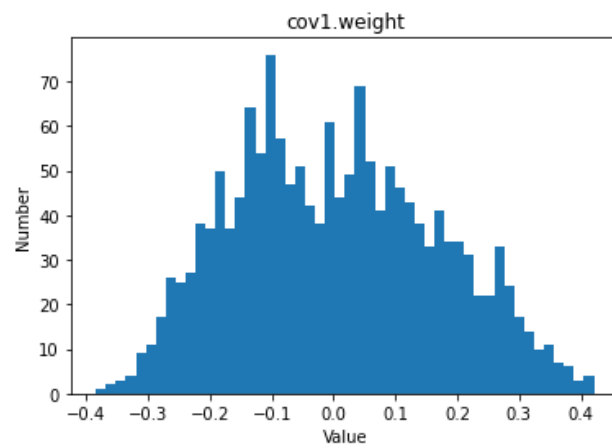


### 2. Accuracy Chart :

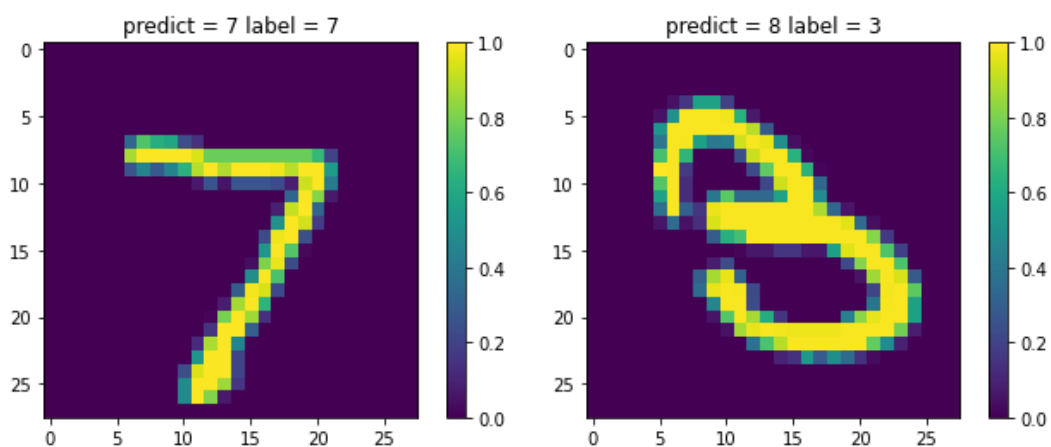
Training → 99.520%    Validation → 98.740%    Test → 98.910%



### 3. Distributions of weights and biases :



C. Examples of correctly classified and miss-classified :



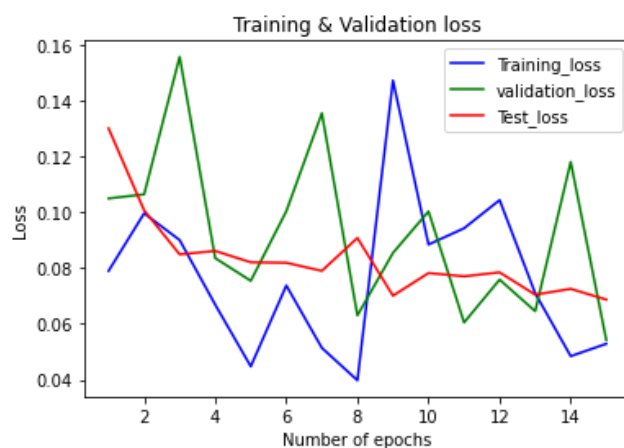
D. Feature maps :

從圖中可以看出分辨數字一的主要是看有沒長直線的出現。

手寫數字 1	Feature maps	
原始		
Cov1 output & after maxpool		
Cov2 output & after maxpool		

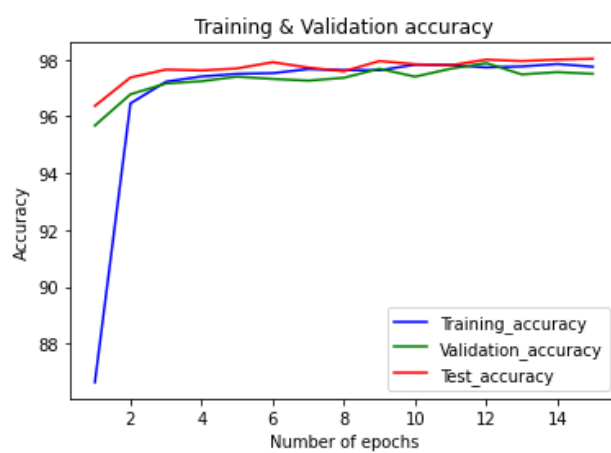
E. 相關圖表( add L2 regularization)

1. Learning Curve :

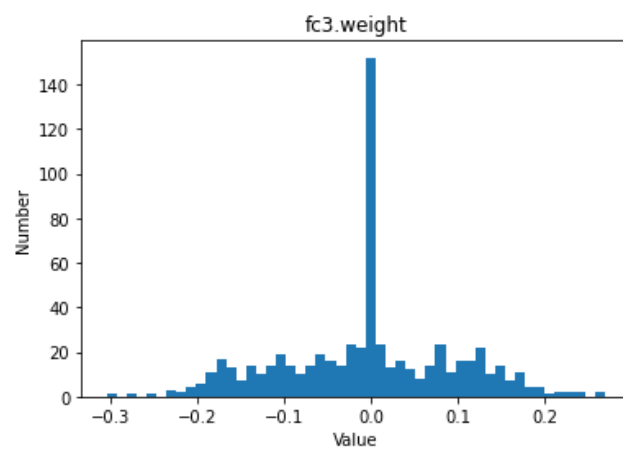
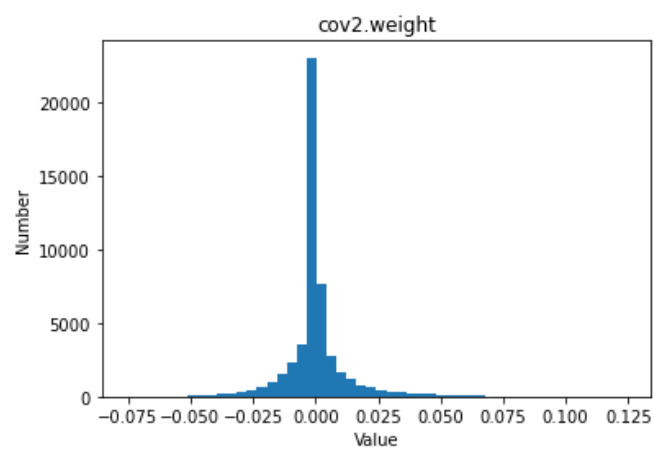
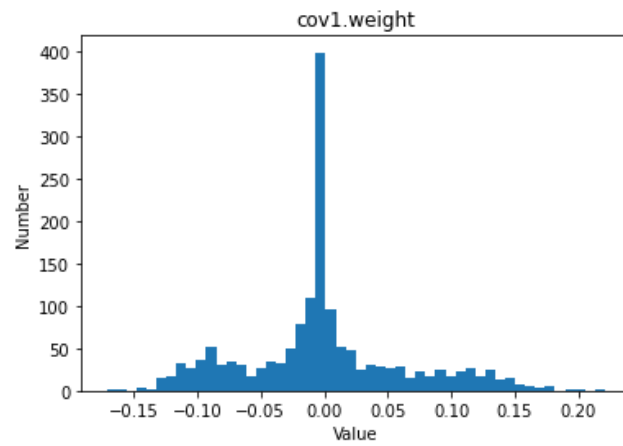


2. Accuracy Chart :

Training → 97.751%    Validation → 97.500%    Test → 98.030%



### 3. Distributions of weights and biases :



貳、CIFAR10 圖像辨識：

A. 程式於附檔 HW002\_2.py

Epoch = 15、Batch = 100、Learning rate = 0.001

模型架構：

```
CNN_Model(  
  (cov1): Conv2d(3, 64, kernel_size=(5, 5), stride=(1, 1))  
  (relu1): ReLU()  
  (maxpool1): MaxPool2d(kernel_size=2, stride=2, padding=0, dilation=1, ceil_mode=False)  
  (cov2): Conv2d(64, 16, kernel_size=(7, 7), stride=(1, 1))  
  (relu2): ReLU()  
  (maxpool2): MaxPool2d(kernel_size=2, stride=2, padding=0, dilation=1, ceil_mode=False)  
  (fc1): Linear(in_features=256, out_features=128, bias=True)  
  (relu3): ReLU()  
  (fc2): Linear(in_features=128, out_features=64, bias=True)  
  (relu4): ReLU()  
  (fc3): Linear(in_features=64, out_features=10, bias=True))
```

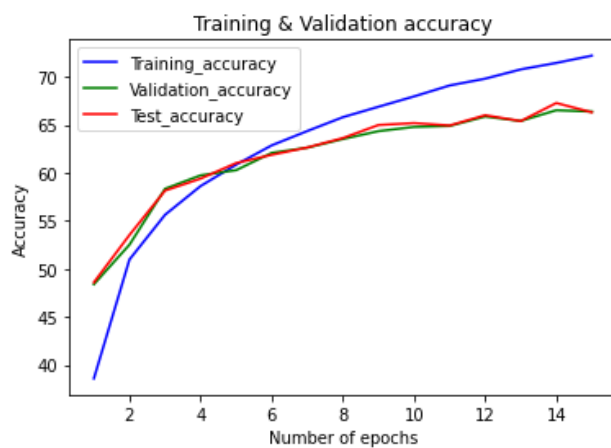
## B. 作業相關圖表

### 1. Learning Curve :



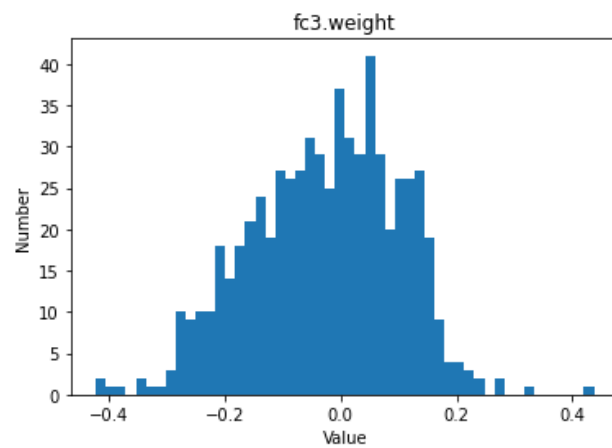
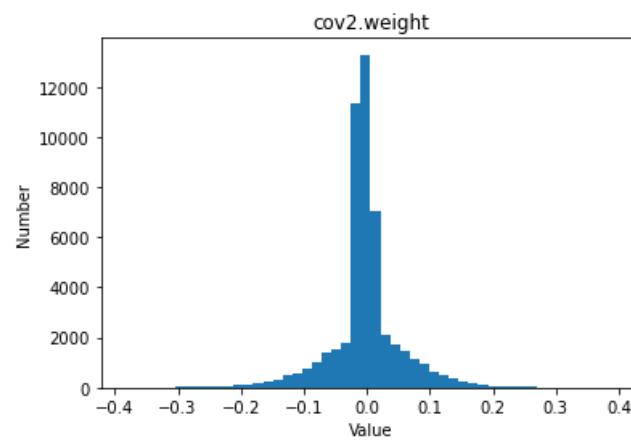
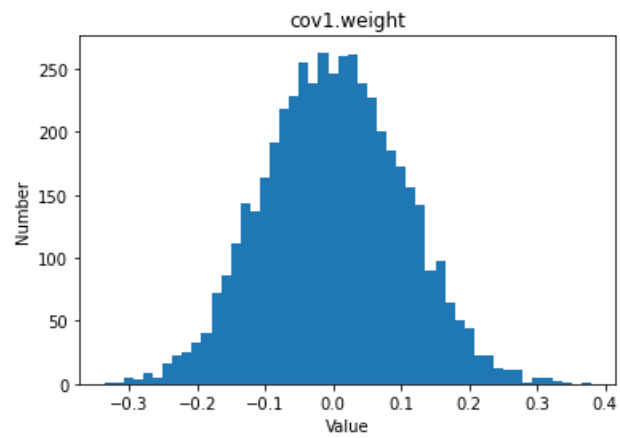
### 2. Accuracy Chart :

Training → 72.200%    Validation → 66.380%    Test → 66.300%

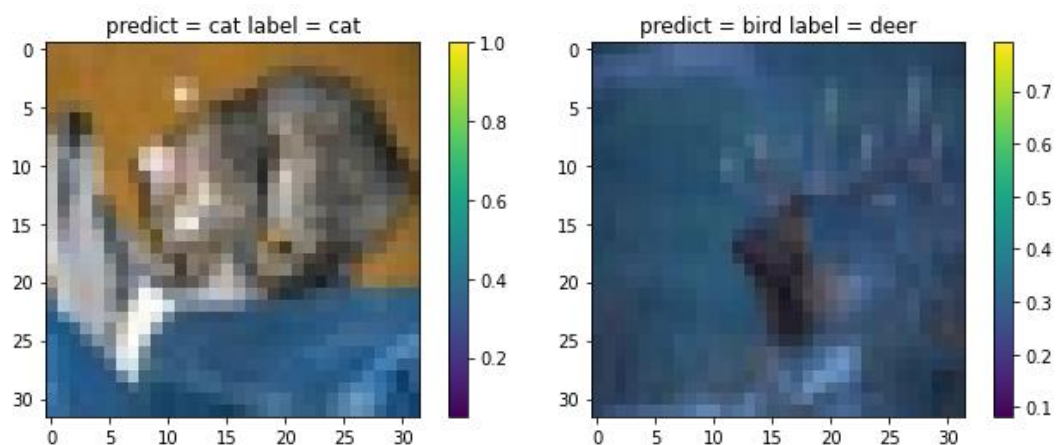




### 3. Distributions of weights and biases :



C. Examples of correctly classified and miss-classified :



D. Feature maps :

從圖中可以看出分辨貓的主要是看有沒長尖耳朵的出現。

手寫數字 1	Feature maps	
原始		
Cov1 output & after maxpool		
Cov2 output & after maxpool		

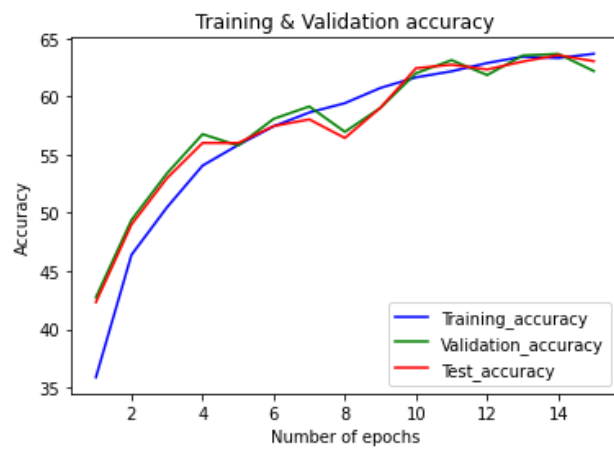
E. 相關圖表( add L2 regularization)

1. Learning Curve :



2. Accuracy Chart :

Training → 63.669%    Validation → 62.180%    Test → 63.030%



### 3. Distributions of weights and biases :

