

# AMA564 Deep Learning Assignment 2

Chen Yushuo  
24081349G

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## Question 1

(1).

For  $f_1$ , the out put matrix will be  $5 \times 5$  size. And

$$y_{11} = 1 \times 0 + 1 \times 0 + 0 \times 0 + 0 \times 1 = 0.$$

Repeat it for every entries of  $y$ , then we can get the result matrix:

$$y^1 = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 \\ 1 & 2 & 2 & 2 & 1 \end{bmatrix}.$$

For  $f_2$ , the result is:

$$y^2 = \begin{bmatrix} 0 & 1 & 0 & 0 & 1 \\ 0 & 2 & 0 & 0 & 2 \\ 0 & 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 & 1 \end{bmatrix}.$$

For  $f_3$ , the result is:

$$y^3 = \begin{bmatrix} 0 & -1 & 0 & 0 & -1 \\ -1 & 0 & 0 & -1 & 0 \\ -1 & 1 & 0 & -1 & 1 \\ 0 & -1 & -1 & -1 & -1 \\ -1 & 0 & 0 & 0 & 1 \end{bmatrix}.$$

(2).

*MaxPool* will extract the max entry from the  $2 \times 2$  sub-matrix. And the final result will be in  $3 \times 3$  since stride 2. The result is:

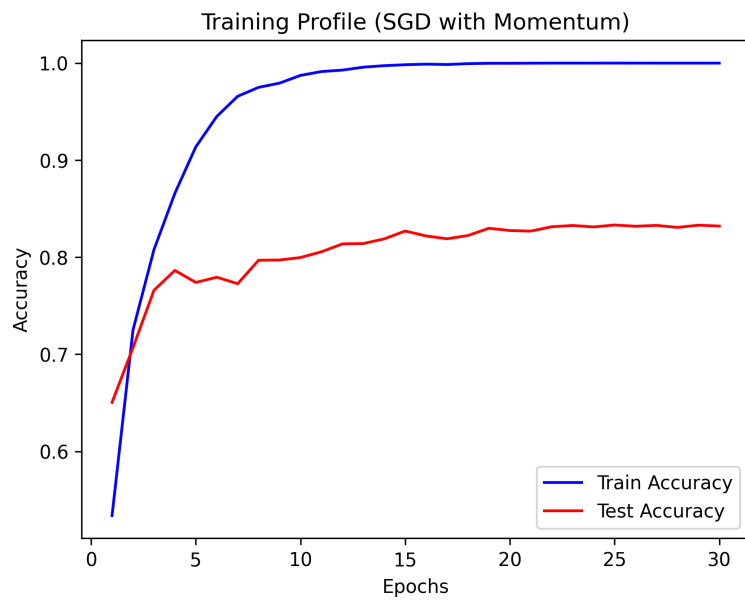
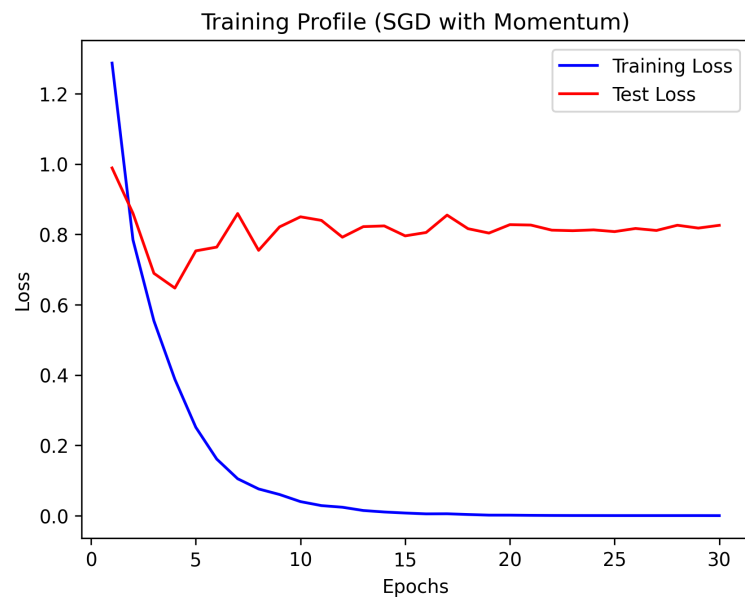
$$\begin{bmatrix} 1 & 0 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 1 \end{bmatrix}.$$

(3).

If we take the average, all entries will be  $(1 + 1)/9 = 2/9$ . So the result will be:

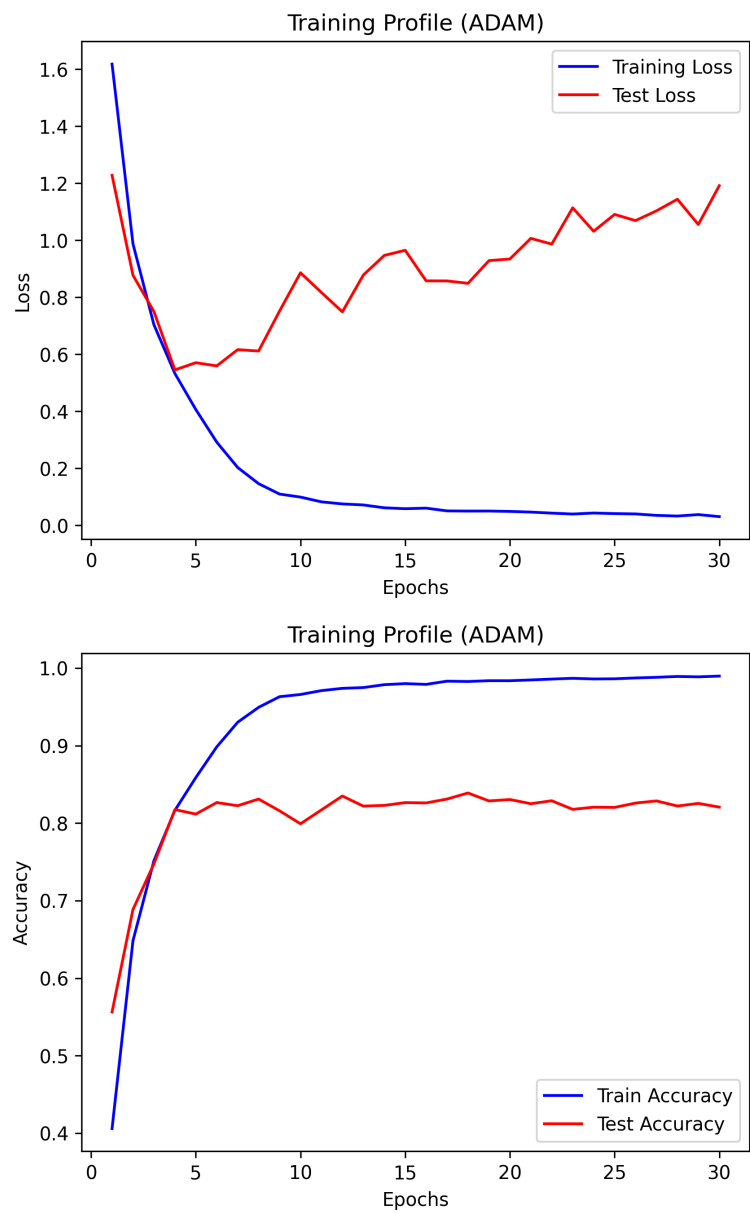
$$\begin{bmatrix} 2/9 & 2/9 \\ 2/9 & 2/9 \end{bmatrix}.$$

**Question 2.(1).**



Train accuracy almost reaches 100%. Test accuracy reaches 83%, avg loss is 0.82 more or less.

(2).



Train accuracy also reaches 100%. Test accuracy reaches 82.5%, avg loss is more than 1.15.

**Question 3.**

- (a) False.
- (b) True.
- (c) True.
- (d) False.
- (e) True.

**Question 4.**

- (a) - (e):  
D B B D A.