Name : Priyank Bhavsar
Enroll : 190120120009
Class : 7th CEIT First Mid

Batch : AB6

Subject : Deep Learning
(2CEIT78PE1 ~~02~~)

Q1

- There are three type of deep neural nework which are MLP, CNN, RNN.

- MLP (Multi-layer perceptrons) :- MLP is a fully Connected network.
It is frequently observed that it refers to deep feed-forward network or feed-forward neural network in some literature

- ↳ It is common in simple logistic and linear regression problem
  ↳ It is not an optimal processing Sequential and multi-dimensional data pattern.

- Convolutional Neural Network (CNN) :-
  ↳ CNN is used for multidimensional data like image and videos, CNNs excel in extracting feature maps for classification, segmentation, generation and other downstream task.

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↳ In some cases, a CNN in the form of a 1D convolution is also used for networks with sequential input data.

- **Recurrent Neural Network :-**
  - For sequential data input RNN are popular to use because the internal design allows the network to discover dependency in the history of the data, which is useful for predection.

* **loss function :-**

- loss function is an prediction error of Neural Net.
- There are four types of loss function
  1) Mean squared Error (MSE)
  2) Binary Crossentropy (BCE)
  3) Categorical Crossentropy (CC)
  4) Sparse Categorical Crossentropy (SCC)

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↳ Mean Squared Error (MSE) :-

- It is calculated by taking mean of squared differences between actual and predicted values.

- example :- we have a neural network which takes house data and predicts house Price. In this case, you can use the MSE loss. Basically in the case where the output is a real number.

↳ Binary Crossentropy :-

- BCE loss is used for the binary classification task. If you are using BSE loss function you just need ~~to~~ one output node to classify the data in two classes.

example :- It is used to predict the data of atmosphere where it's going to rain or not.

↳ Categorical Crossentropy (CCE) :- when we have a multi-class classification task, one of the loss function you can go ahead

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is this one. If you are using CCE loss function, there must be the same numbers of output nodes as the classes.

example :- It is used to classify the image where the image is of bike or a car.

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Q4)

- Long short term memory is kind of recurrent neural net work.
- LSTM can process not only single data points but also entire sequence of data
- LSTM was designed by hack Kriter and Schmidhuber it tackled by the problom of long term dependencies of RNN in which the RNN cannot predict the word stored in long term memory but can give more accurate prediction form the recent information.
- LSTM can by default retain the information for long period of time. It is used for processing predicting and classifing on the basis of time series data.

Units of LSTM :-

1) Cell :- LSTM recurrent unit maintain a vector called cell state which conceptually describe the information that was chosen to be retained by the previous LSTM recurrent

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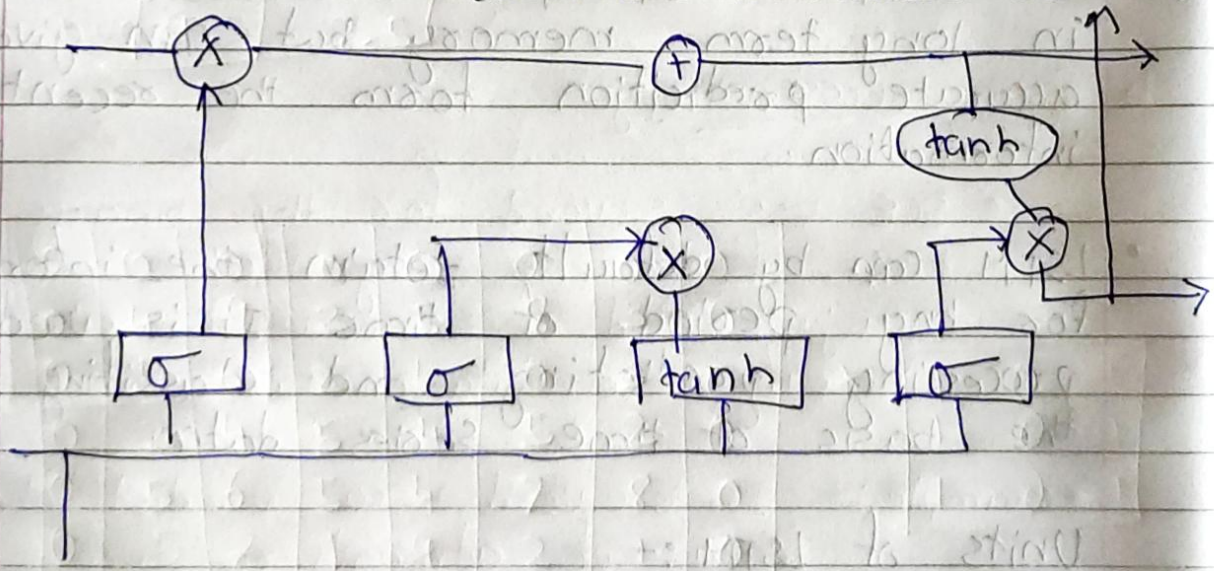
2) forget gate :- It determines to what extend to forget the previous data.

3) Input gate :- It determines the extend of information to be written onto the Internal cell state.

4) Output Crate :- It determines what output to generate the current internal cell state



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Q5)

Max - Pooling

3	13	17	11
5	3	1	23
7	1	2	3
11	17	1	4

(i)

3	13
5	3

max = 13

(ii)

17	11
1	23

max = 3

(iii)

7	1
11	17

max = 17

(iv)

2	3
1	4

max = 4

∴ 2* Max poling

13	23
17	4

* Average Pooling

3	13	17	11
5	3	1	23
7	1	2	3
11	17	1	4

i)

3	13
5	3

$$\frac{3 + 13 + 5 + 3}{4}$$

$$= 6$$

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ii)

12	11
1	23

$\therefore \frac{12+11+1+23}{4} = 13$

iii)

7	1
11	12

$\therefore \frac{7+1+11+12}{4} = 9$

iv)

2	3
1	4

$\therefore \frac{2+3+1+4}{4} = 2.5$

$\therefore$ 2*2 Average Pooling

6	13
9	7.5

B]

0	0	0
0	4	9
0	5	6

0	0	0	0	0	0	0	0
0	2	4	5	8	3	0	
0	5	6	5	4	7	8	0
0	5	7	7	9	2	1	0
0	5	8	5	3	8	4	0
0	0	0	0	0	0	0	0

2	4	5
5	4	5
5	4	7
7	9	2
5	3	8

*

1	0	-1
1	0	-1
1	0	-1

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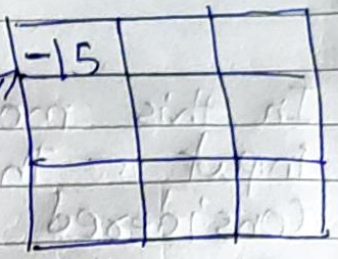
Parameters

Size: f = 3
Stride: S = 2
Padding: P = 1



$= 0*1 + 0*0 + 0*(-1) +$
$0*1 + 4*0 + 9*(-1) +$
$0*1 + 9*0 + 6*(-1) +$

$= -15$