DL Assignment -5

TAHER HARI
D007

No of RNN units = 2

$$W_x = \begin{bmatrix} 3 & -4 \end{bmatrix} \qquad b_h = 0$$

$$W_h = \begin{bmatrix} 4 & -5 \\ -3 & 2 \end{bmatrix} \qquad b_y = 10$$

$$W_y = \begin{bmatrix} -4 \\ 2 \end{bmatrix} \qquad h_0 = \begin{bmatrix} 0 & 0 \end{bmatrix}$$

$x_1 = 1 \quad x_2 = 2 \quad x_3 = 3$

$$h_t = \tanh\left(W_x \cdot x_t + W_h \cdot h_{t-1} + b_h\right)$$

$$h_1 = \tanh\left(1 \times \begin{bmatrix} 3 & -4 \end{bmatrix} + 0 + 0\right)$$

$$= \begin{bmatrix} 0.99505 & -0.99932 \end{bmatrix}$$

$$h_2 = \tanh\left(2 \times \begin{bmatrix} 3 & -4 \end{bmatrix} + \begin{bmatrix} 0.99505 & -0.99932 \end{bmatrix} \begin{bmatrix} 4 & -5 \\ -3 & 2 \end{bmatrix} + 0\right)$$

$$= \begin{bmatrix} 0.99999 & -1 \end{bmatrix}$$

$$h_3 = \tanh\left(3 \times \begin{bmatrix} 3 & -4 \end{bmatrix} + \begin{bmatrix} 0.9999 & -1 \end{bmatrix} \begin{bmatrix} 4 & -5 \\ -3 & 2 \end{bmatrix} + 0\right)$$

$$= \begin{bmatrix} 1 & -1 \end{bmatrix}$$

$$\hat{y}_t = W_y \cdot h_t + b_y = \begin{bmatrix} 1 & -1 \end{bmatrix} \begin{bmatrix} -4 \\ 2 \end{bmatrix} + 10 = -6 + 10$$

$$\hat{y}_t = 4$$

Q2]

Embedding → 71676

11946 × 6

(vocab length) (o/p dim)

Simple RNN(1) → 4544

or

(64 × 64) + (64 × 6) + 64

recurrent weights | no. of units × no. of features from embedding | biases (backprop)

Simple RNN(2) → 3104

32 × 32 + 32 × 64 + 32

(recurrent weights) | (no. of units × no. of prev layers) | (backprop)

Simple RNN(3) → 784

(16 × 16) + 16 × 32 + 16

recurrent weights | i/p weights | backprop

Dense → 408

24 × 16 + 24

no. of units × no. of prev layers | backprop

Dense (o/p layer) → 150

6 × 24 + 6

no. of o/p × no. of prev layer | backprop