DEEP LEARNING

ASSIGNMENT - 1

NAME : ROMIL HOLKAR

ROLL NO : D009

COURSE : M.TECH (DATA SCIENCE 2021-2023)

COLLEGE : NMIMS - MPSTME

Q.1. No. of RNN units = 2

$W_x = [3, -4]$; $b_h = 0$

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

$h_0 = [0, 0]$

$W_y = \begin{bmatrix} -4 \\ 2 \end{bmatrix}$; $x_1 = 1$, $x_2 = 2$, $x_3 = 3$

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

$h_1 = \tanh(1 \times [3 \quad -4] + 0 + 0)$

$\boxed{h_1 = [0.99505 \quad -0.99932]}$

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

$\boxed{h_2 = [0.99999 \quad -1]}$

$h_3 = \tanh\left(3 \times [3 \quad -4] + [0.99999 \quad -1] \begin{bmatrix} 4 & -5 \\ -3 & 2 \end{bmatrix} + 0\right)$

$\boxed{h_3 = [1 \quad -1]}$

$$\hat{y}_t = w_y h_t + b_y$$

$$\hat{y}_t = w_y h_3 + b_y = \begin{bmatrix} 1 & -1 \end{bmatrix} \begin{bmatrix} -4 \\ 2 \end{bmatrix} + 10 = -6 + 10$$

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

Q.2. **I.** Embedding $\longrightarrow$ 72120

12020 × 6

{Input Dim = vocab len} {Required output dim}

II. Simple RNN (1) $\longrightarrow$ 4544

(64×64) + (64×6) + 64

{Recurrent weights} {No. of units × No. of features form Embed} {Backprop.}

III. Simple RNN (2) $\longrightarrow$ 3104

(32×32) + (32×64) + (32)

{Recurrent weights} {Input weights} {Backprop.}

IV. Simple RNN (3) $\longrightarrow$ 784

(16×16) + (16×32) + 16

{Recurrent weights} {Input weights} {Backprop}

V. Dense → 408

(24 × 16) + 24

{No. of units × No. of previous RNN layer} {Backprop}

VI. Dense (output layer) → 150

+ 6

(6 × 24)

{No. of o/p units × no. of previous Hidden layer} {Backprop}