DL Assignment 5

Q(1) No of RNN units = 2

$W_x = [3 \quad -4]$ $\quad b_h = 0$

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

$W_y = \begin{bmatrix} -4 \\ 2 \end{bmatrix}$ $\quad h_0 = [0 \quad 0]$

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

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

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

$= [0.99505 \quad -0.99932]$

$h_2 = \tanh(3 \times [3 \times -4] + [0.9991 \quad -1] \begin{bmatrix} 4 & -5 \\ -3 & 2 \end{bmatrix} + 0)$

$= [1. \quad -1]$

$\hat{y}_t = W_y \cdot h_{t-1} + b_y$

$\hat{y}_t = W_y \cdot h_3 + b_y$

$= [1 \quad -1] \begin{bmatrix} -4 \\ 2 \end{bmatrix} + 10$

$= -6 + 10$

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

Q(2) (I) Embedding → 72300

12050 × 6

(input dim = vocal size) (layer o/p dim)

(II) Simple RNN (1) → 4544

(64×64) + (64×6) + 64

(recurrent-weight = no. of unit × no. of unit) (no. of unit × no. of features from embedding) (bias) backprop

(III) Simple RNN (2) → ~~384~~ 3104

(32×32) + (64×32) + 32

(recurrent weight) (i/p weight) (backprop)

(IV) Simple RNN (3) → 784

(16×16) + (16×32) + 16

(recurrent weight) (i/p weight) (backprop)

(V) Dense → 408

(24×16) + 24

(No. of units × no. of units of previous RNN) backprop

(VI) Dense (o/p layer) → 180

(6 × 24) + 6

no. of o/p units × no. of units of previous hidden layer backprop

Model: "sequential"

Layer (type)	Output Shape	Param #
embedding (Embedding)	(None, 20, 6)	72300
simple_rnn (SimpleRNN)	(None, 20, 64)	4544
simple_rnn_1 (SimpleRNN)	(None, 20, 32)	3104
simple_rnn_2 (SimpleRNN)	(None, 16)	784
dropout (Dropout)	(None, 16)	0
dense (Dense)	(None, 24)	408
dense_1 (Dense)	(None, 6)	150

Total params: 81,290
Trainable params: 81,290
Non-trainable params: 0