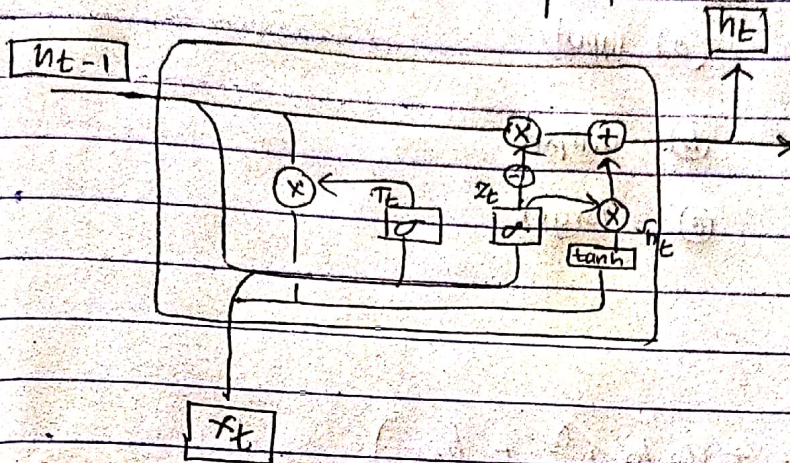


09/03/2022

GRU \rightarrow gated recurring unit
Computationally faster than LSTM



x_t : input vector

h_t : output vector

\hat{h}_t : candidate activation vector

z_t : update gate vector

r_t : reset gate vector

W, U, b : parameter matrices and vector.
weight bias

RNN and GRU have no cell, memory unlike LSTM.

RNN and GRU ~~have~~ work only with hypothesis. Computation will be different.

RNN \rightarrow had a major problem \rightarrow vanishing gradient problem
To omit this problem, basically the GRU system is implemented.

$h_t, \tilde{h}_t, h_{t-1}$ will all have the same dimension

GRU has two gates:

LSTM has 3 gates

(a) update gate z_t

(a) input

(b) reset gate r_t

(b) output

(c) forget

$$\# z_t = \sigma(w_z \cdot x_t + u_z h_{t-1} + b_z)$$

$$\# r_t = \sigma(w_r \cdot x_t + u_r h_{t-1} + b_r)$$

$$\# \tilde{h}_t = \tanh(w_h \cdot x_t + u_h (h_{t-1} \odot r_t) + b_h)$$

$$\# h_t = (1 - z_t) \odot h_{t-1} + z_t \odot \tilde{h}_t$$

Difference betⁿ LSTM and GRU:

(a) GRU has 2 gates while LSTM has 3.

(b) GRU has no cell memory, ~~data~~ ~~was~~ while LSTM has.

(c) GRU works only with hypothesis computationally while LSTM works with hypothesis & cell memory both.

duita matrix multiply korte 1st matrix er column and second matrix er row same hote hoi

Result = ~~Row~~ First matrix er Row x 2nd matrix er column.

if $h_t = 5 \times 1$ matrix.

$$\text{then } \overset{w_2}{z_t} = \begin{bmatrix} \quad \end{bmatrix} \begin{bmatrix} \quad \end{bmatrix} + \begin{bmatrix} \quad \end{bmatrix} \begin{bmatrix} \quad \end{bmatrix}$$

$w_2 \quad 5 \times 5 \quad 5 \times 1$
 $u_2 \quad 5 \times 1$

\downarrow
 \downarrow

(5×1)
 (5×1)

because same
dimensions can be added

u_2 and $w_2 \rightarrow$ amra
Choose
Korbo bujhe

The n $w_2 x_t = 5 \times 1$

$u_2 h_{t-1} = 5 \times 1$

$b_2 = 5 \times 1$

Now if $x_t = (5 \times 2)$

$h_{t-1} = 5 \times 2$

$x_t = (5 \times 2)$

$u_2 = 5 \times 5$

$\therefore w_2 = [5 \times 5]$

$w_2 \cdot x_t = 5 \times 2 = u_2 \cdot h_{t-1} = b_2$