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Ans. to the Ques. No. 2

GRU vs peephole-LSTM :

In peephole-LSTM, there is cell state and it allows peeping into the memory.

In GRU, there no cell state, and less complex than LSTM.

LSTM forgate gate : LSTM forget gate work slowly. So, it forget the initial information when the new data is too large. It decides which data need to forget in cell state.

$$f_t = \sigma\left(W_f\left[h_{t-1}, x_t\right] + b_f\right)$$

GRU reset gate - reset gate determines the amount of past information needed to forget and it work independently.

$$r_t = \sigma\left(W_z x_t + U_z h_{t-1}\right)$$

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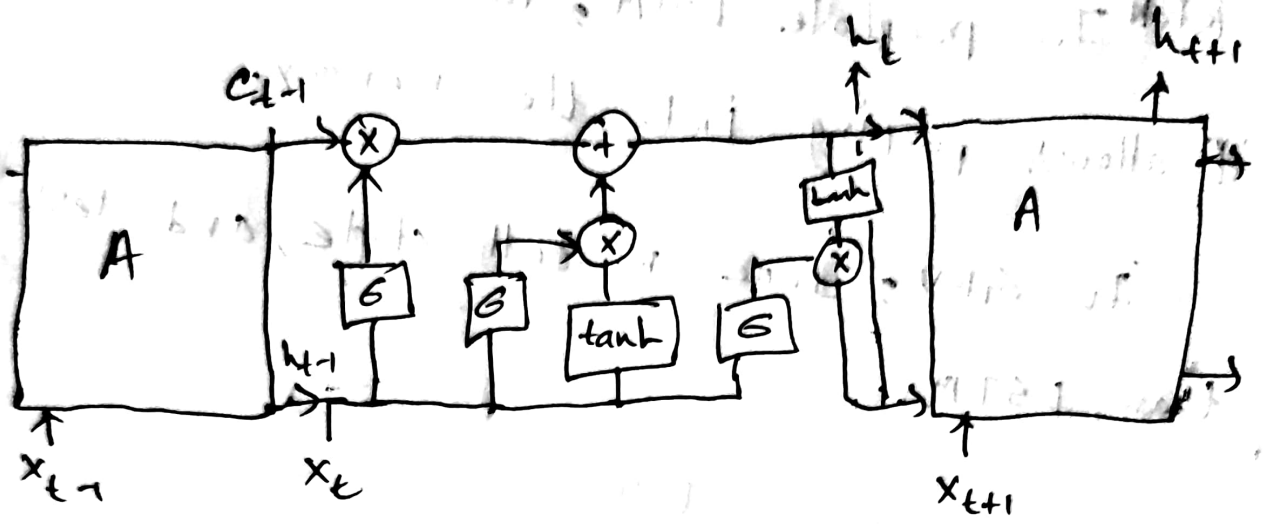
Matrix workflow of LSTM:



The system has 4 matrix computation

- z_f – controls forgate gate
- z_i – controls input gate
- z – Updating information
- z_o – controls output gate

$$z = \tanh\left(\boxed{W}\begin{matrix}x_t \\ h_{t-1}\end{matrix}\right)$$

$$z_i = \sigma\left(\boxed{W_i}\begin{matrix}x_t \\ h_{t-1}\end{matrix}\right)$$

$$z_f = \sigma\left(\boxed{W_f}\begin{matrix}x_t \\ h_{t-1}\end{matrix}\right)$$

$$z_o = \sigma\left(\boxed{W_o}\begin{matrix}x_t \\ h_{t-1}\end{matrix}\right)$$

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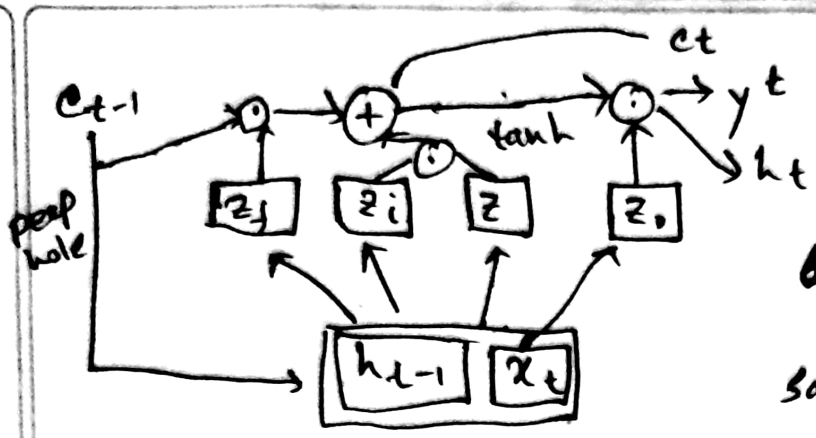

$z = \tanh\left(\boxed{W \mid I} \begin{matrix} x_t \\ h_{t-1} \\ c_{t-1} \end{matrix} \right)$

same ~~for~~ way for,
z_o, z_f, z_i

$$c_t = z_f \odot c^{t-1} + z_i \odot z$$

$$h_t = z_o \odot \tanh(c_t)$$

$$y^t = \sigma(W h_t)$$