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Ans. to the Ques. No. 2

The core difference of RNN, Peephole-LSTM and GRU-

RNN has no cell state. It only works on single function.

Peephole-LSTM has cell state. and it allows peeping into the memory.

GRU has no cell state, and less gates than LSTM.

The basic difference of LSTM forget gate and GRU's reset gate -

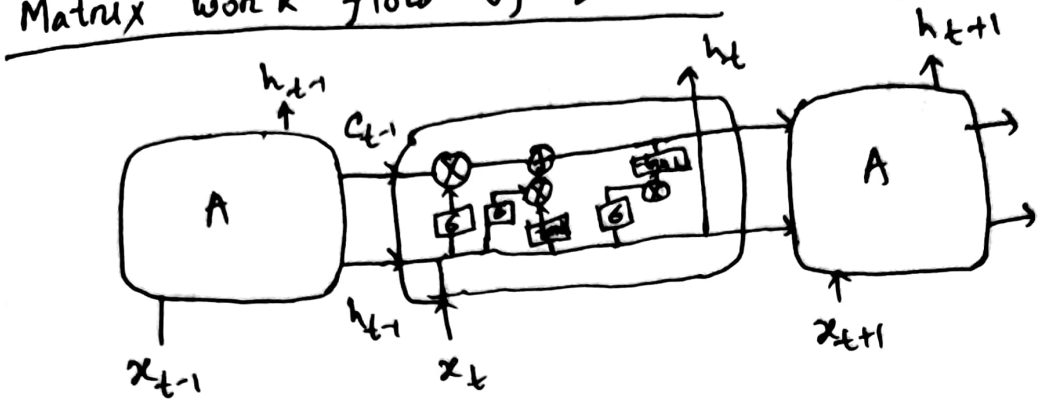
LSTM forget gate:- it works slowly. So, it forget the initial memory when the latest data is too large. It decides which data need to forget in the cell state.

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

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

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

Matrix work flow of LSTM:



The system has 4 matrix computation,

z_f = controls forgate gate

z_i = controls input gate

z = updating information

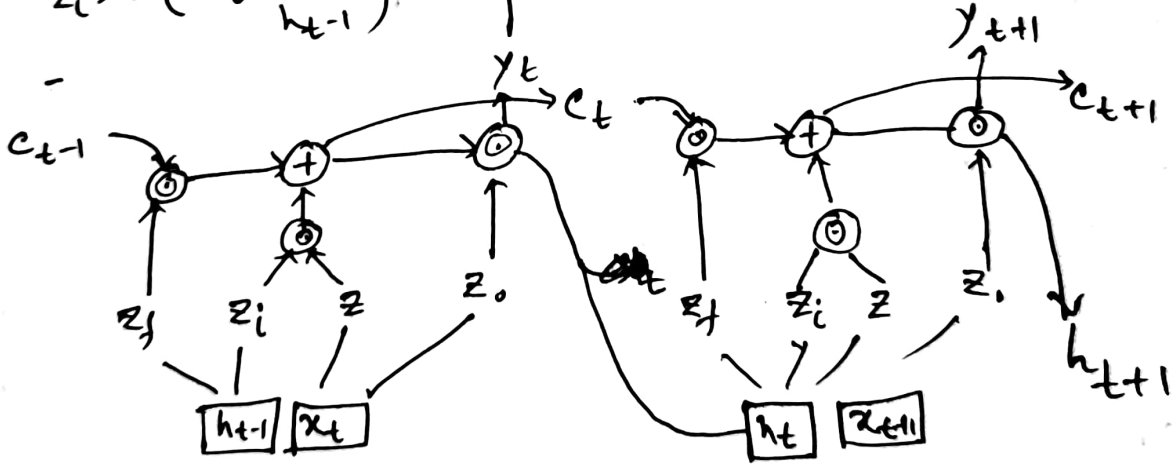
z_o = controls output gate

$$z = \tanh\left(W \frac{x_t}{h_{t-1}}\right)$$

$$z_i = \sigma\left(W_i \frac{x_t}{h_{t-1}}\right)$$

$$z_f = \sigma\left(W_f \frac{x_t}{h_{t-1}}\right)$$

$$z_o = \sigma\left(W_o \frac{x_t}{h_{t-1}}\right)$$



work flow

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

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

$$y_t = \sigma(W' h_t)$$