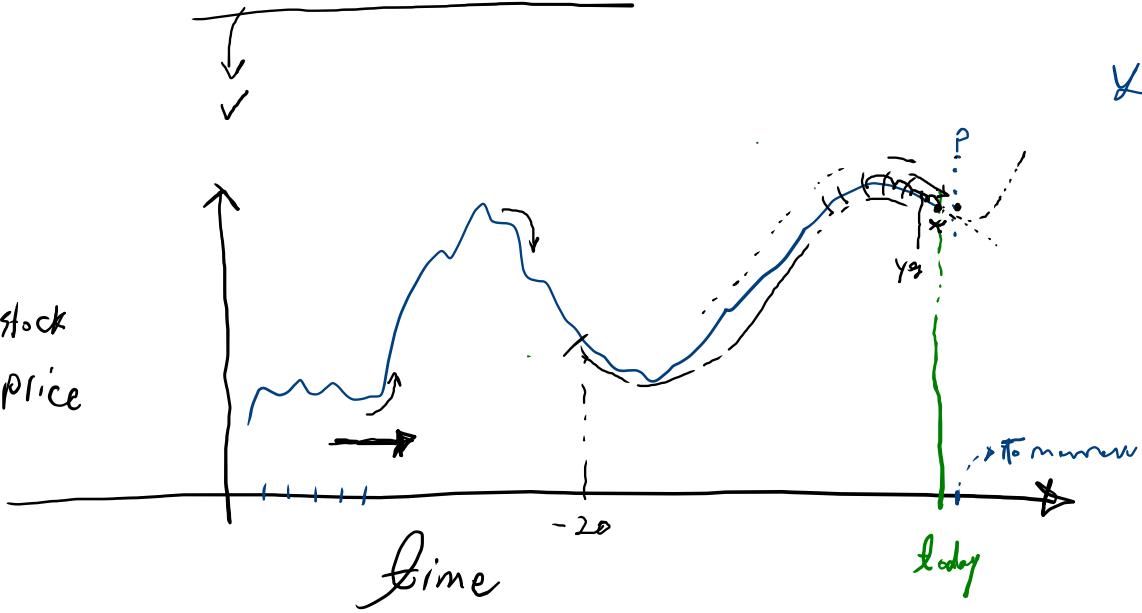


RNN

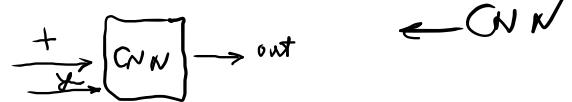
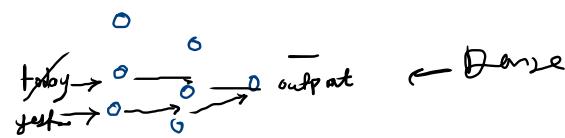
[Recurrent Neural Network]

stock prediction (forecasting)



Xahoo

{
Dense
CNN (Conv layer)}



cell

"*bioRxiv*" Specie "J. J."

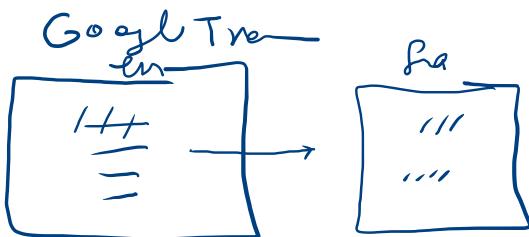
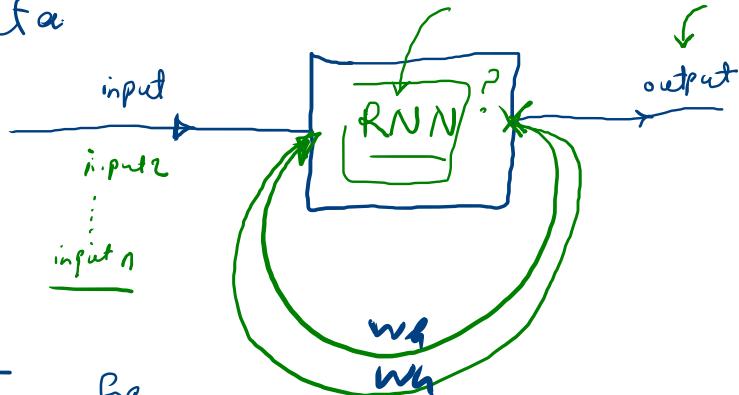
—

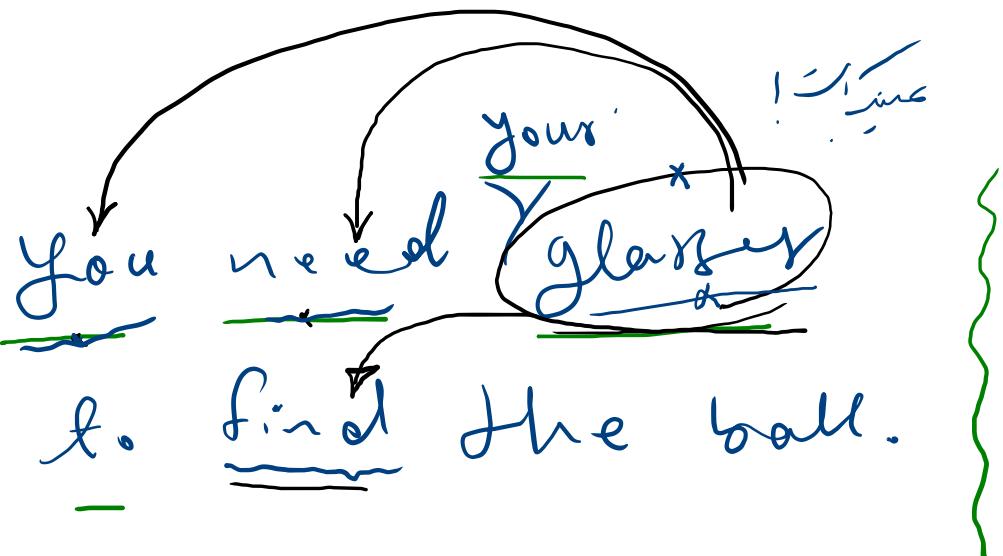
"RNN"

- Time Series!

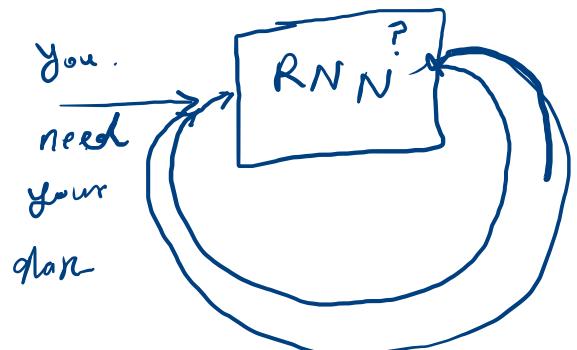
- Sequence data

- Translation (NLP)





in this? , , ,

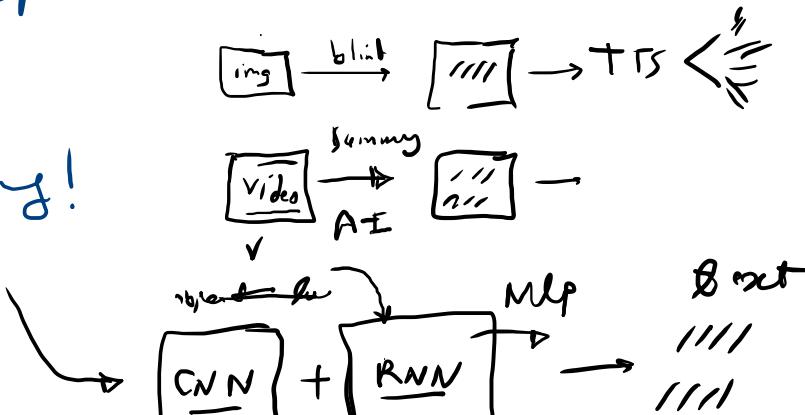
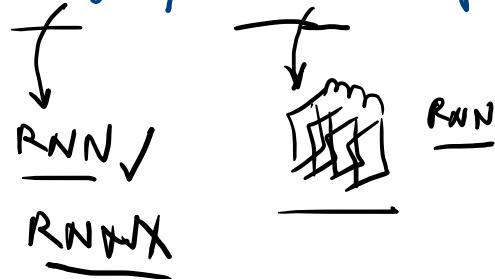


Applications

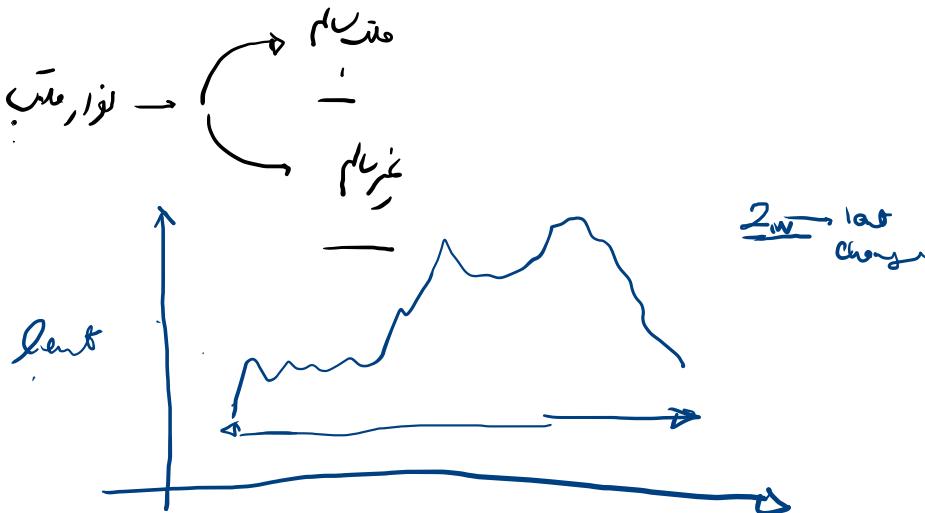
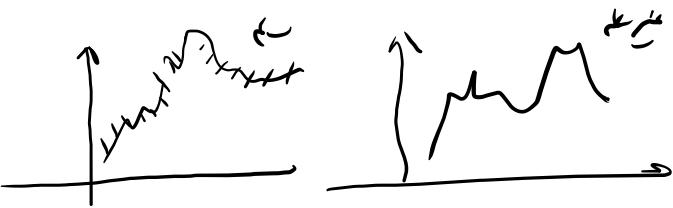
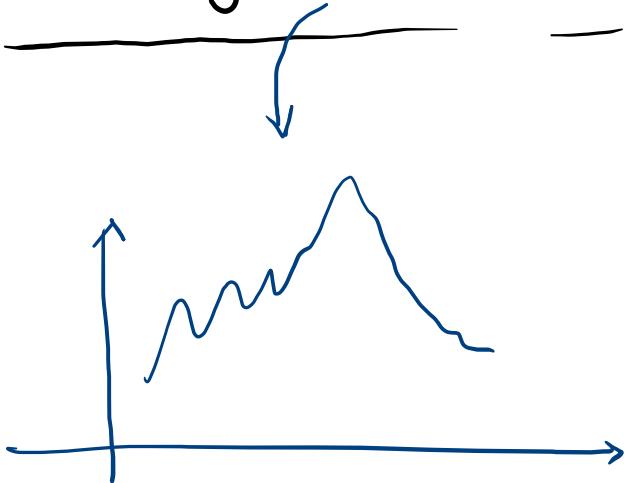
× stock prediction! T^* -

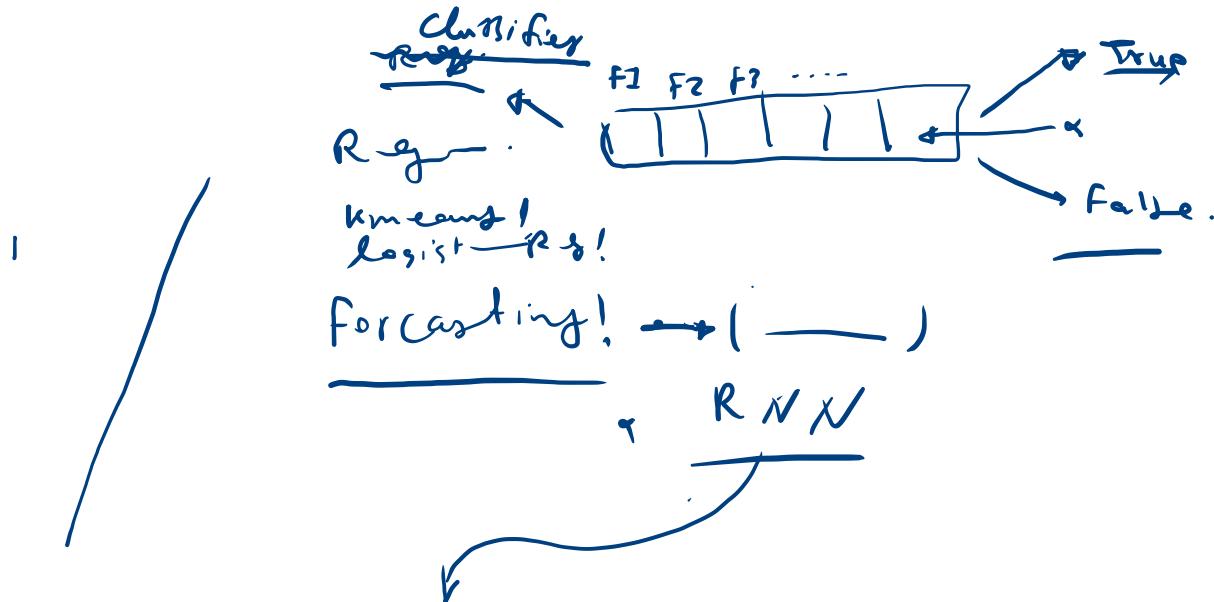
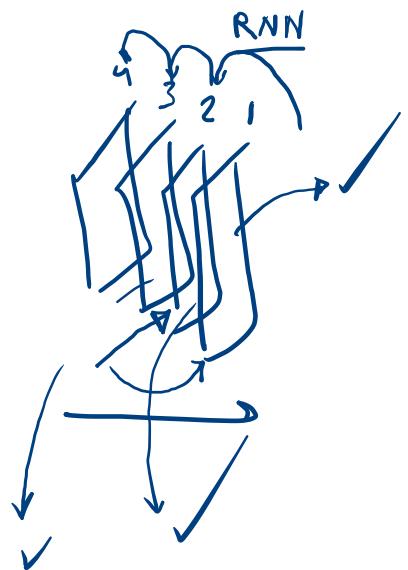
× Translation mlp

× Image / video captioning!

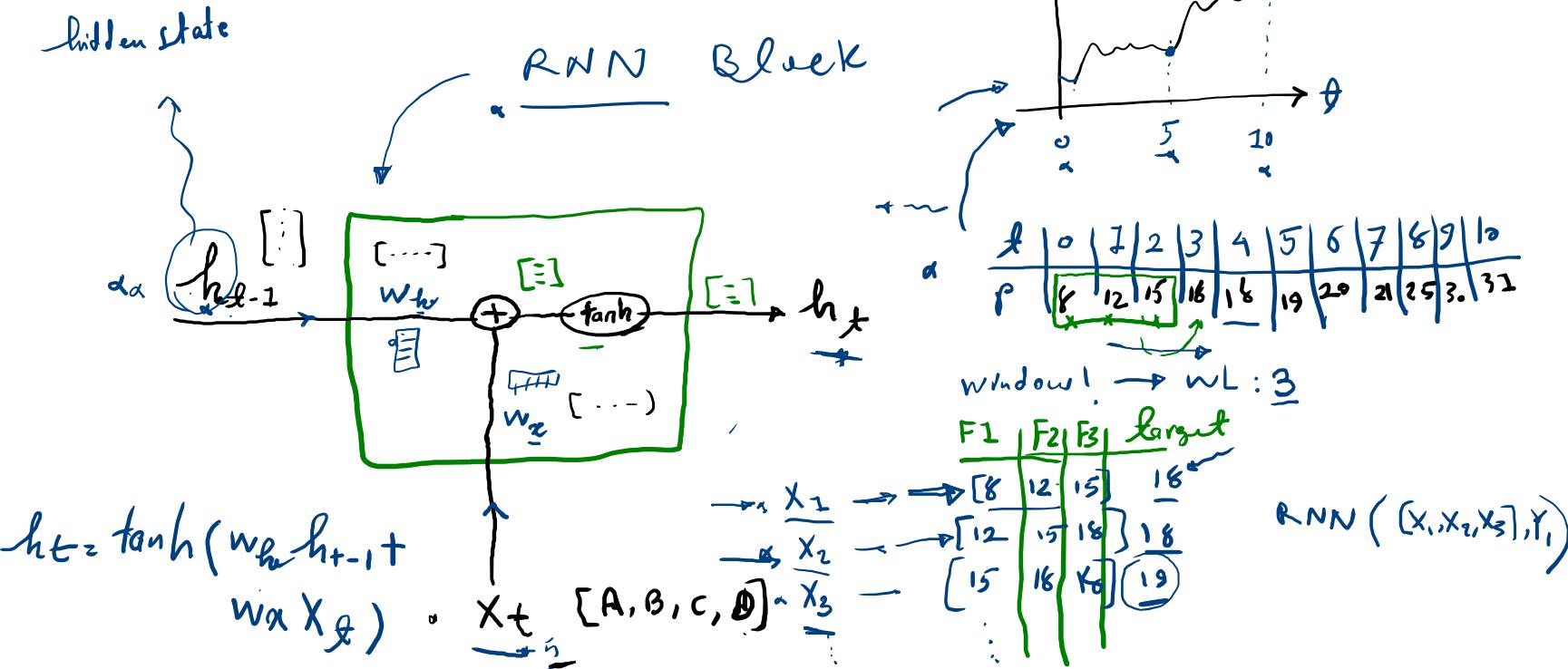


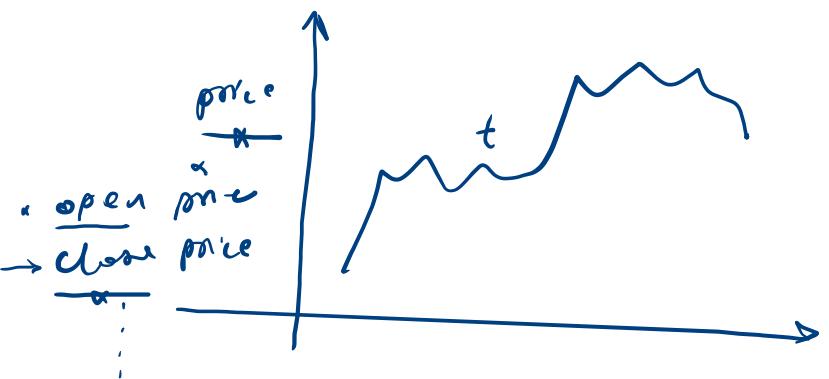
Anomaly Detection!



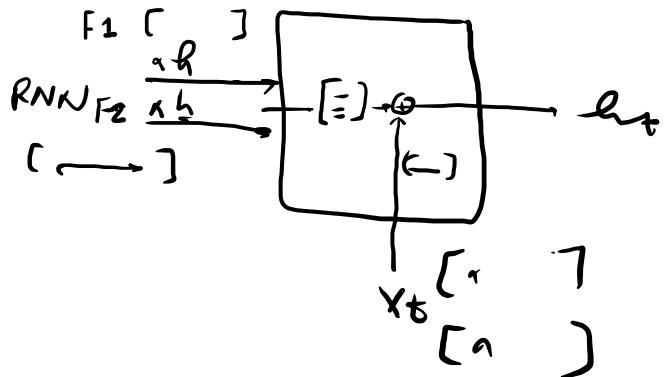


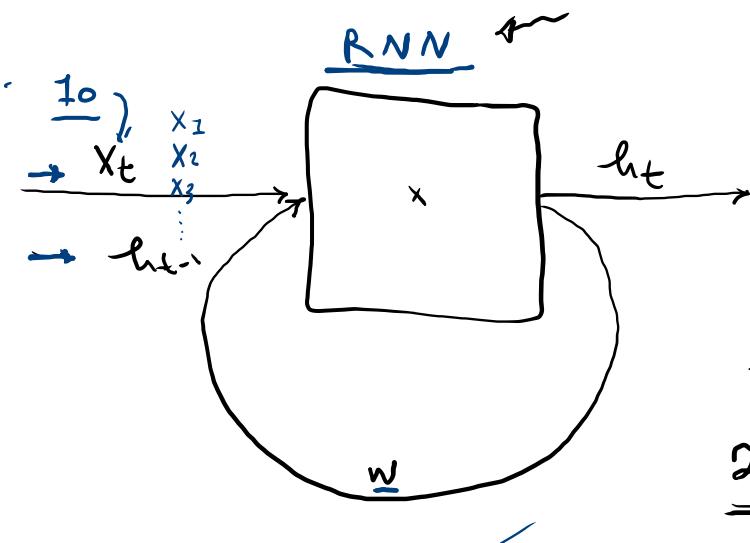
- Traditional RNN
- LSTM
- GRU





$$\underline{2!} \quad \underline{\underline{x_t = w_1 x_1 + w_2 x_2 + \dots}}$$





$$w > I$$

$$2 \times 2 \quad (=)$$

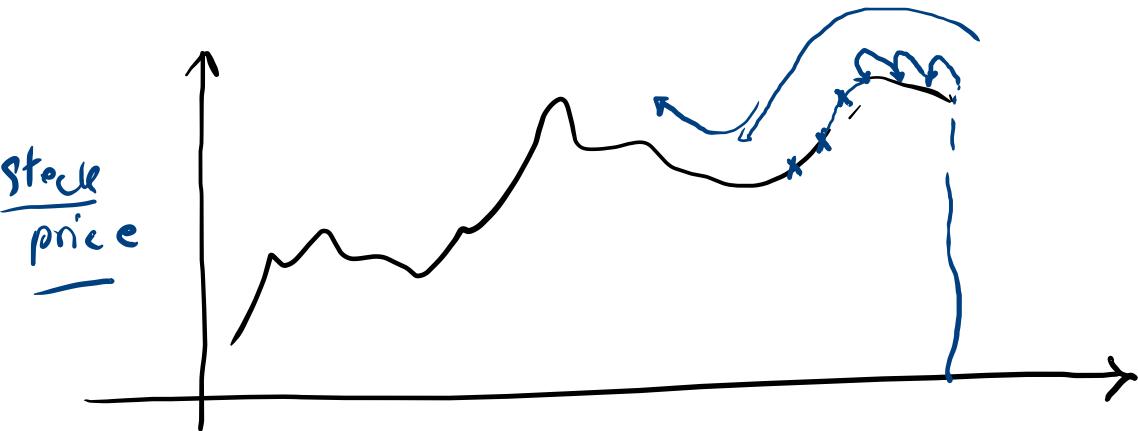
$$2^{10} = \checkmark$$

Exploding G

$$w < 1 \rightarrow 0,2$$

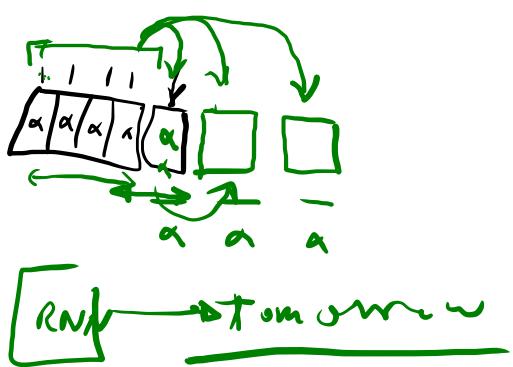
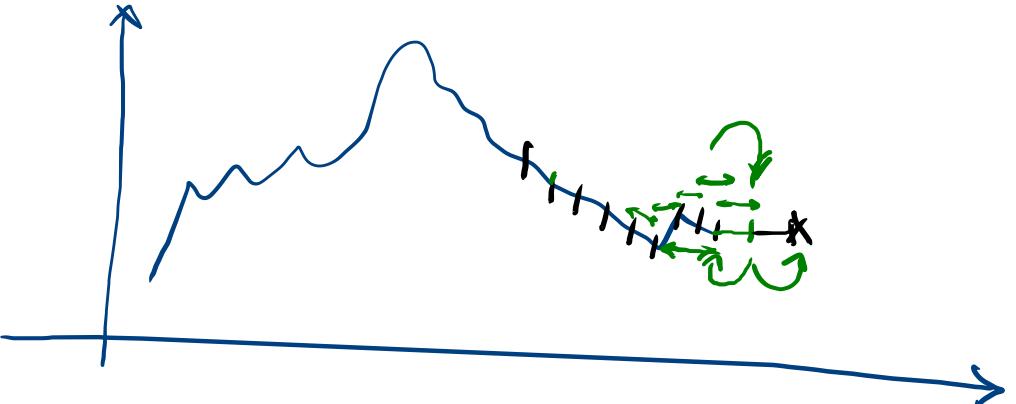
$$(0,2)^{10} \approx 0$$

Vanishing G



short memory!

RNN \rightarrow short term memory!

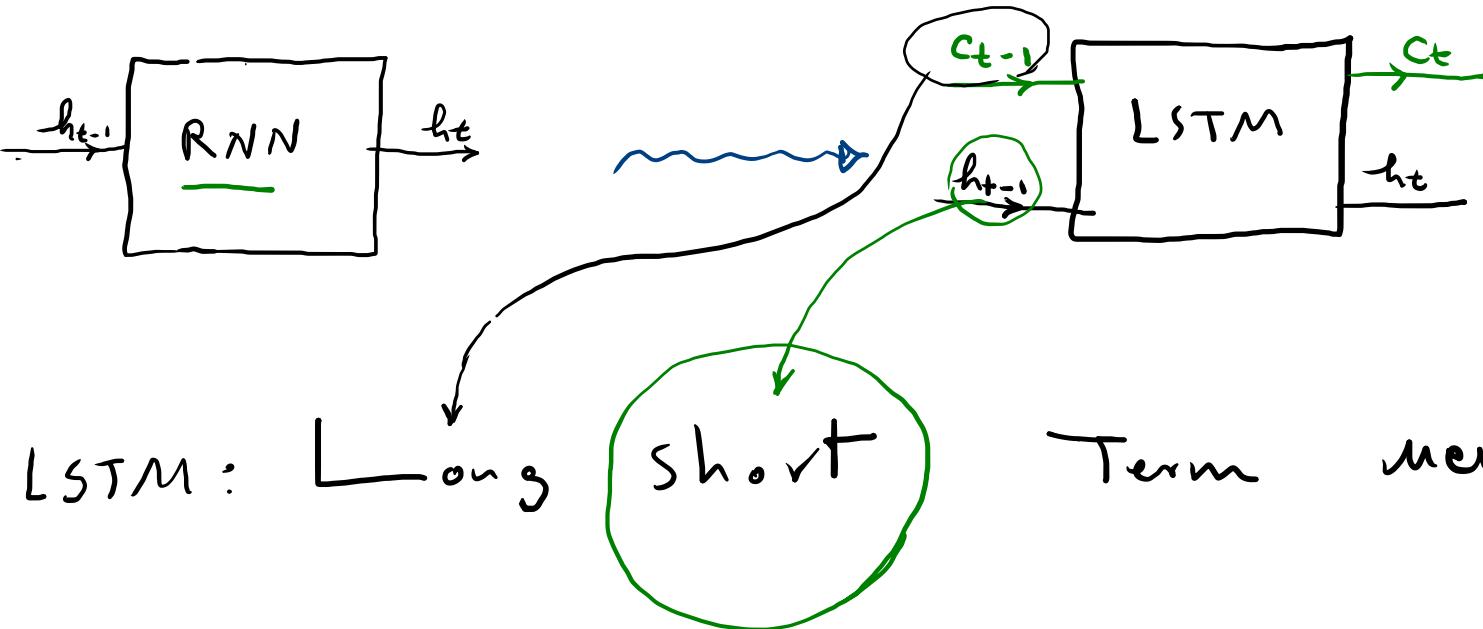


هران کوری رہ خود ریزی سے فارمی مہبے لے نہز.

امین کوئری رہ خود علیاً سے علیی۔ صہبے لے کرنا!

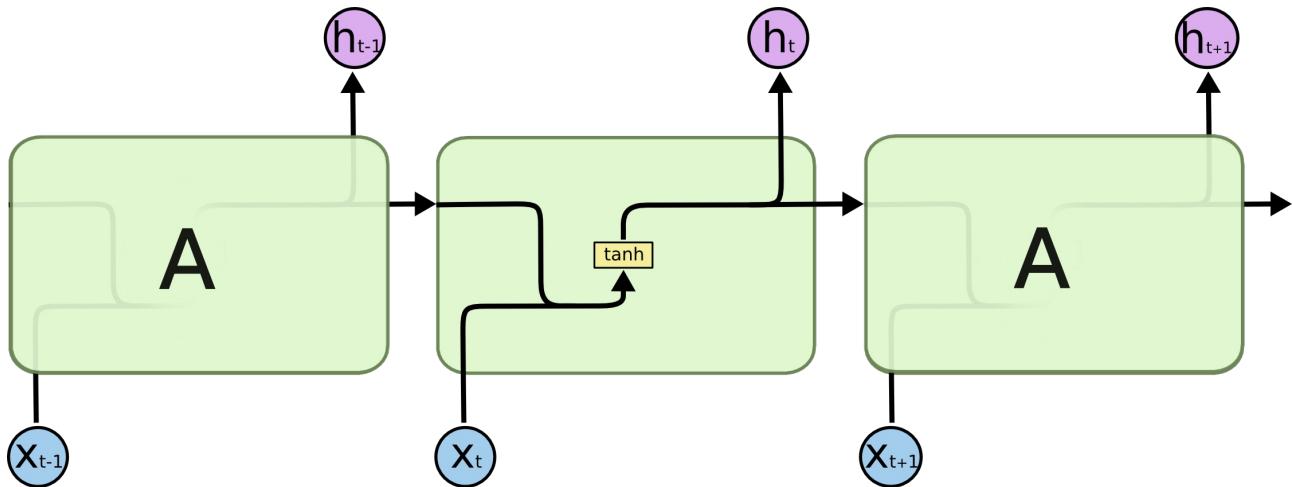
LSTM

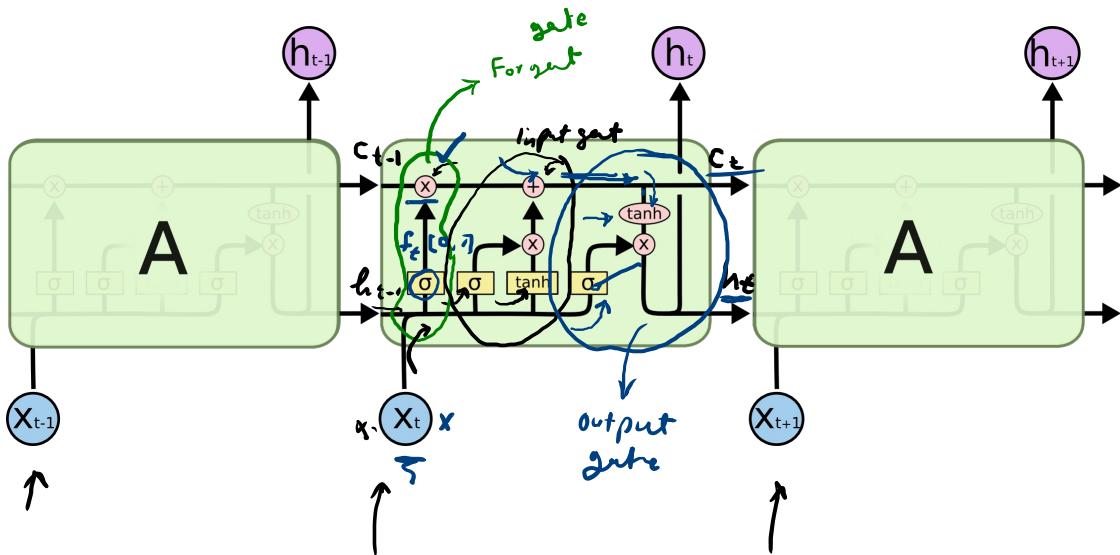
long short term memory



LSTM: Long Short Term memory!

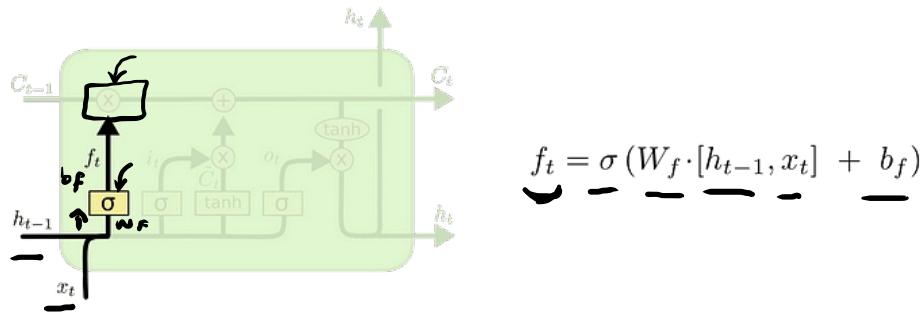
RNN





$$\begin{aligned}
 c_t &: [8, 7, 13] \quad \text{!زیرسازی!} \\
 h_t &: [0, 6, 0, 2] \rightarrow [4, 8, 0, 13]
 \end{aligned}$$

}
 Forget gate: c_{t-1} σ
 !زیرسازی! σ remove

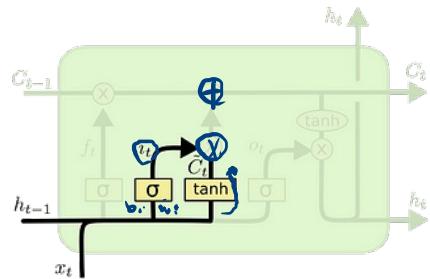


$$f_t = \sigma(W_f \cdot [h_{t-1}, x_t] + b_f)$$

forget gate.

2. input gate \rightarrow cell state \rightarrow new hidden state

لهما

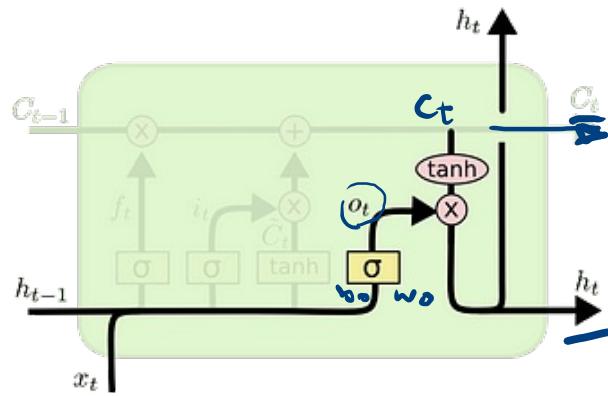


$$i_t = \sigma(W_i \cdot [h_{t-1}, x_t] + b_i)$$

$$\tilde{C}_t = \tanh(W_C \cdot [h_{t-1}, x_t] + b_C)$$

$$\left[\frac{-1}{\sqrt{2}}, \frac{1}{\sqrt{2}} \right] \rightarrow$$

output gate.



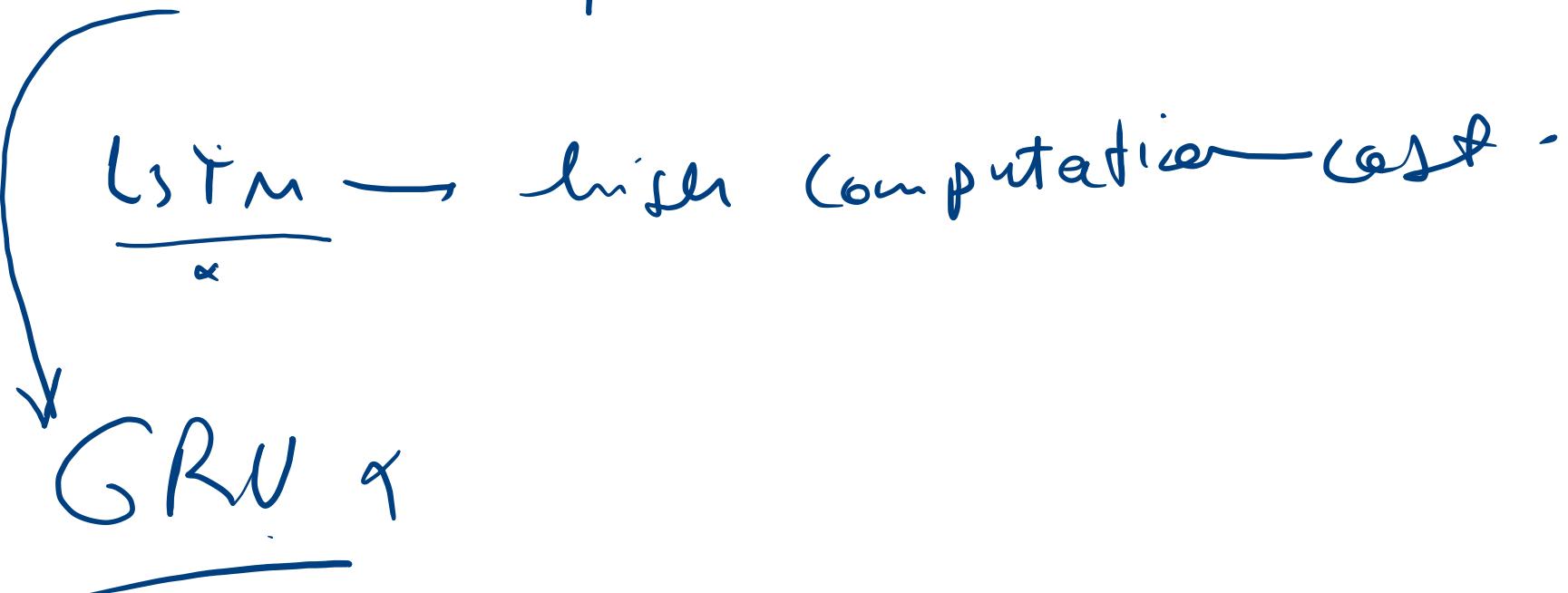
$$\begin{aligned} o_t &= \sigma(W_o [h_{t-1}, x_t] + b_o) \\ h_t &= o_t * \tanh(C_t) \end{aligned}$$

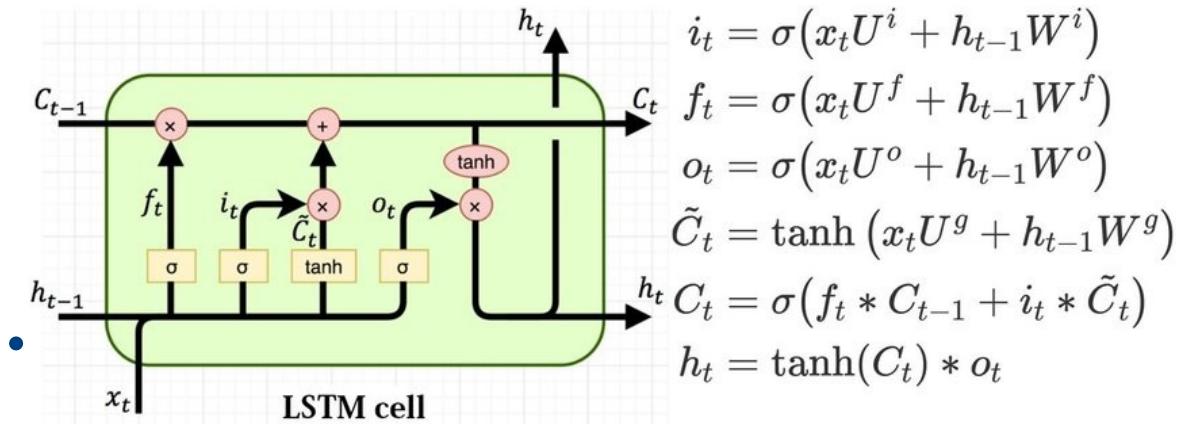
LSTM

- 1. forget gate → ~~pulls off~~ remove
→ Cell state c_t , h_t
- 2. input gate → ~~copies over, forgets~~
Cell state? X_t ?
- 3. output gate

$$c_{t-1} \\ x_t \rightarrow h_t \\ h_{t-1}$$

RNN → Van
exp → short term memory





End