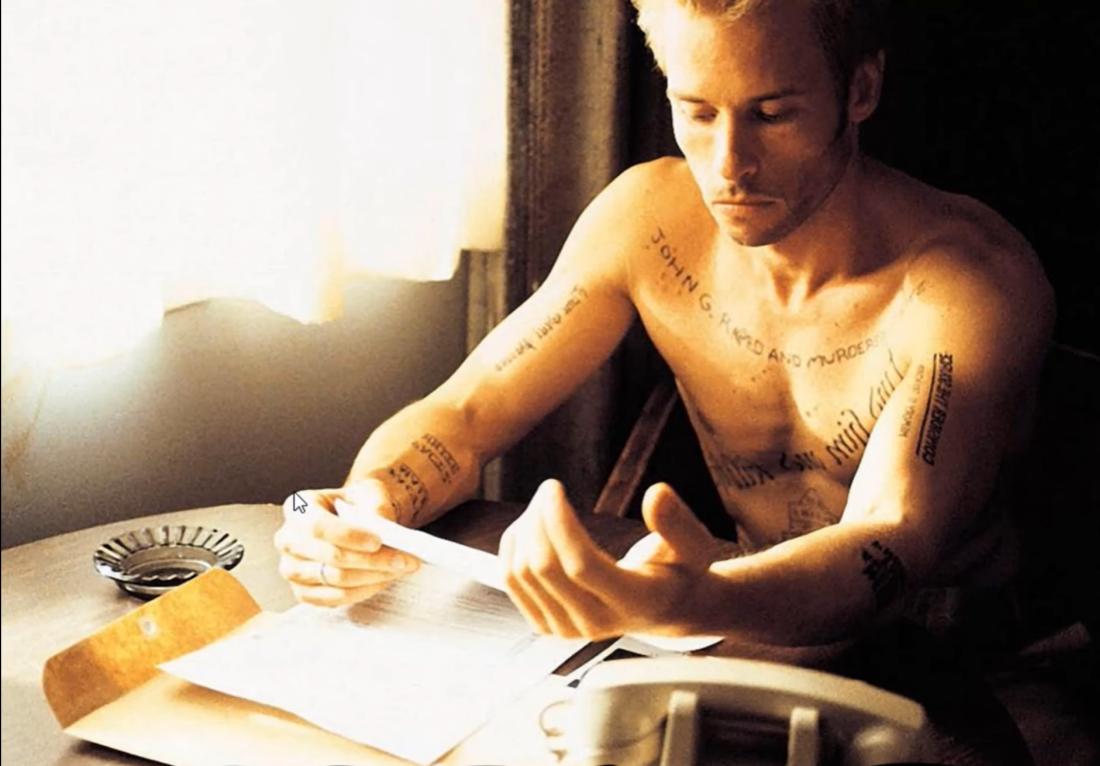


GRU

Gated Recurrent Unit





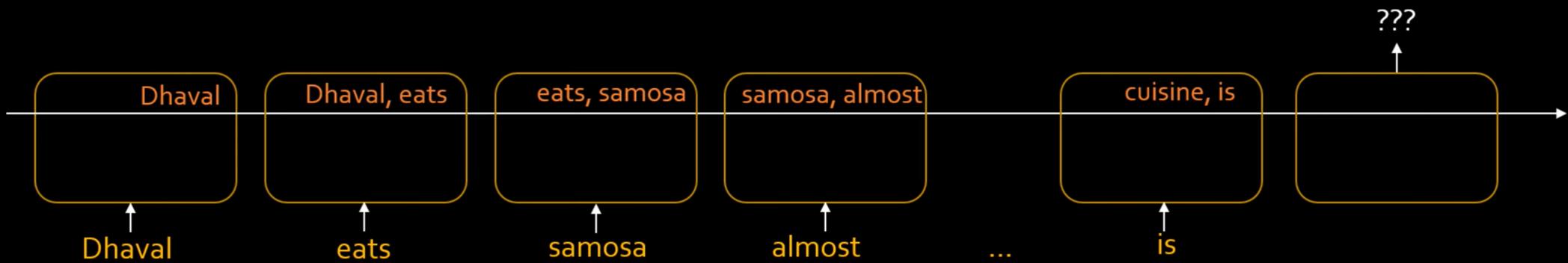
Basic RNN suffer from short term memory problem



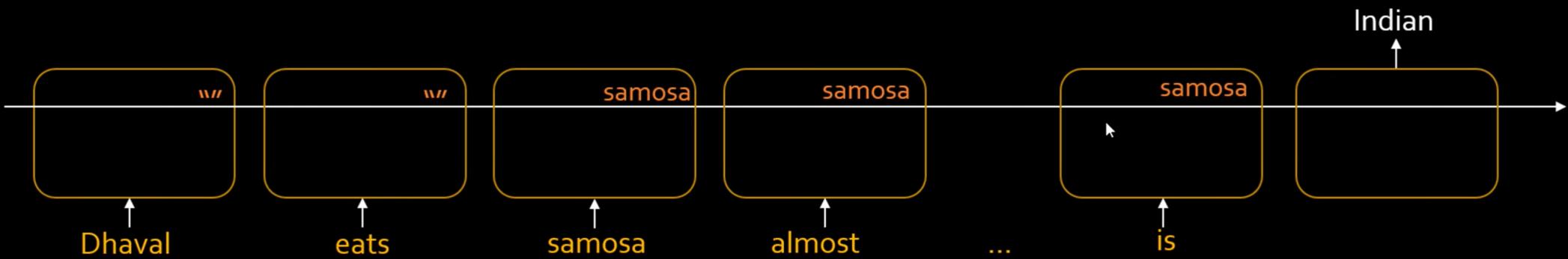
Dhaval eats samosa almost everyday, it shouldn't be hard to guess that his favorite cuisine is Indian



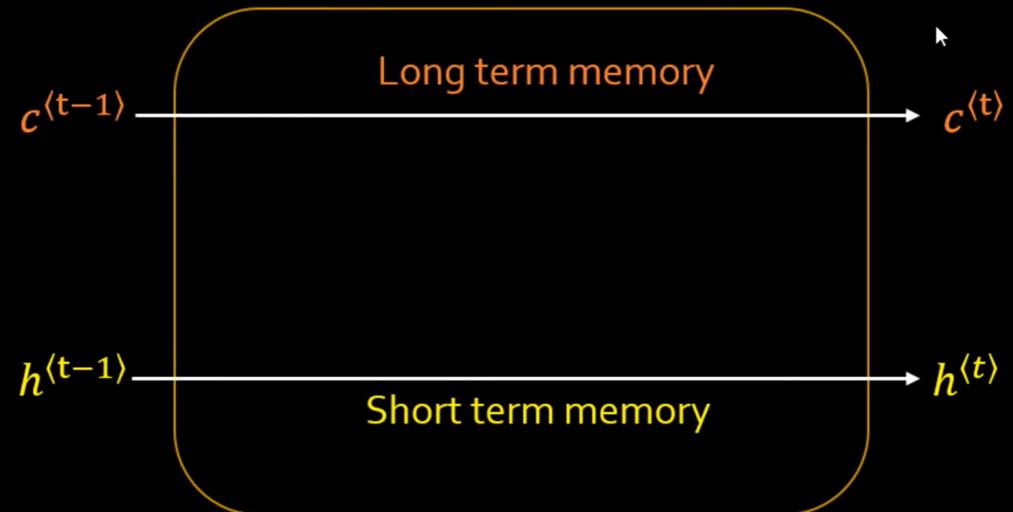
Traditional RNN



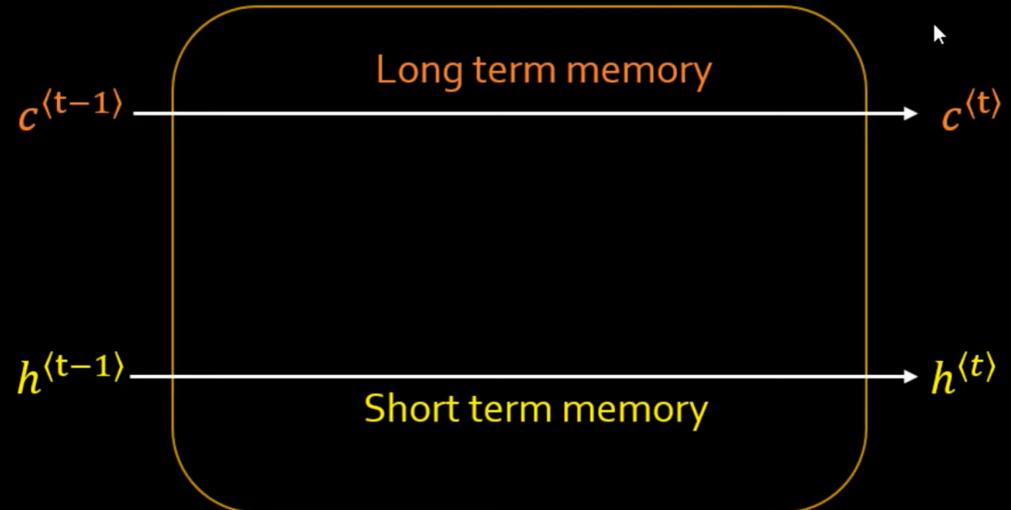
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LSTM



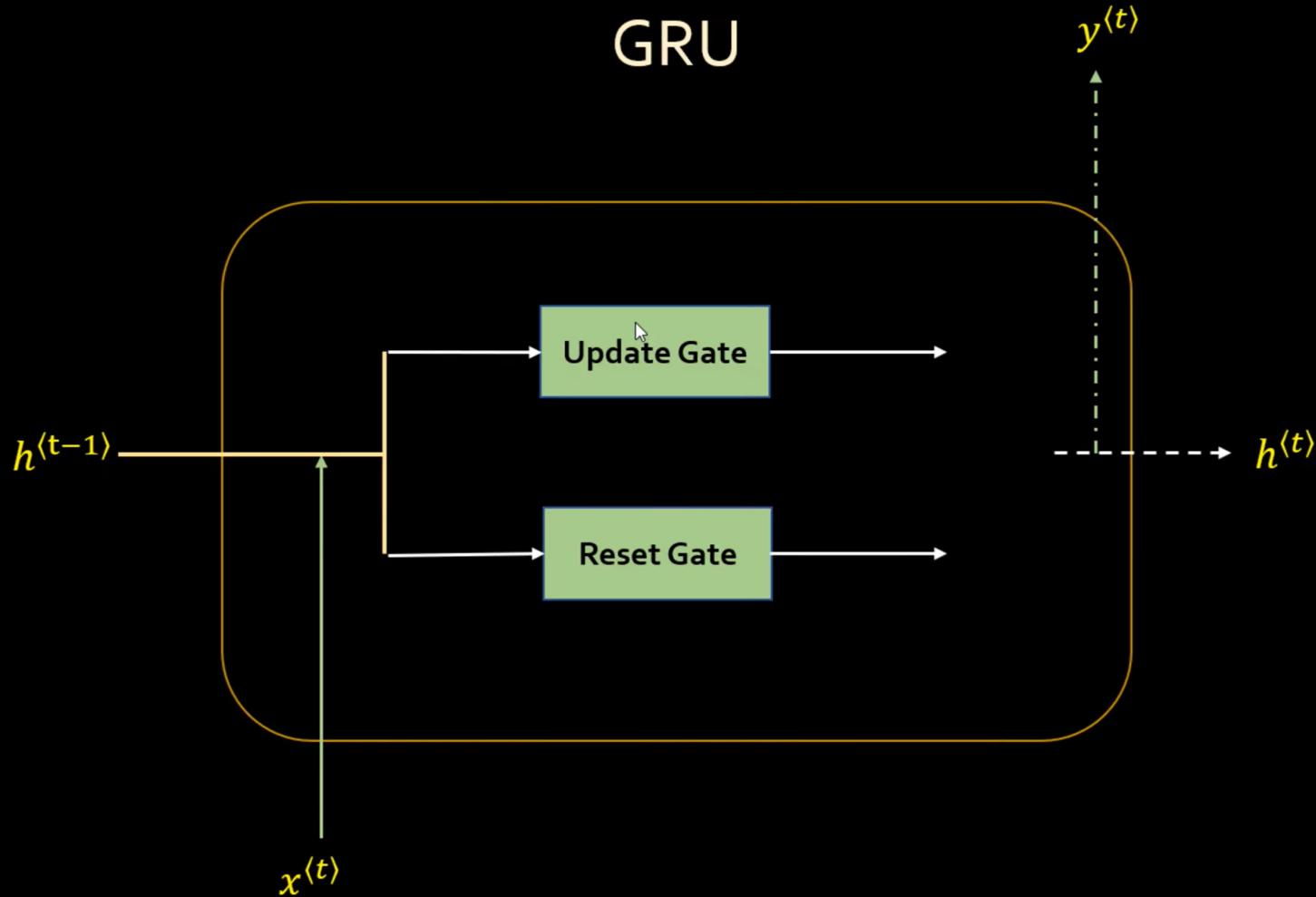
LSTM



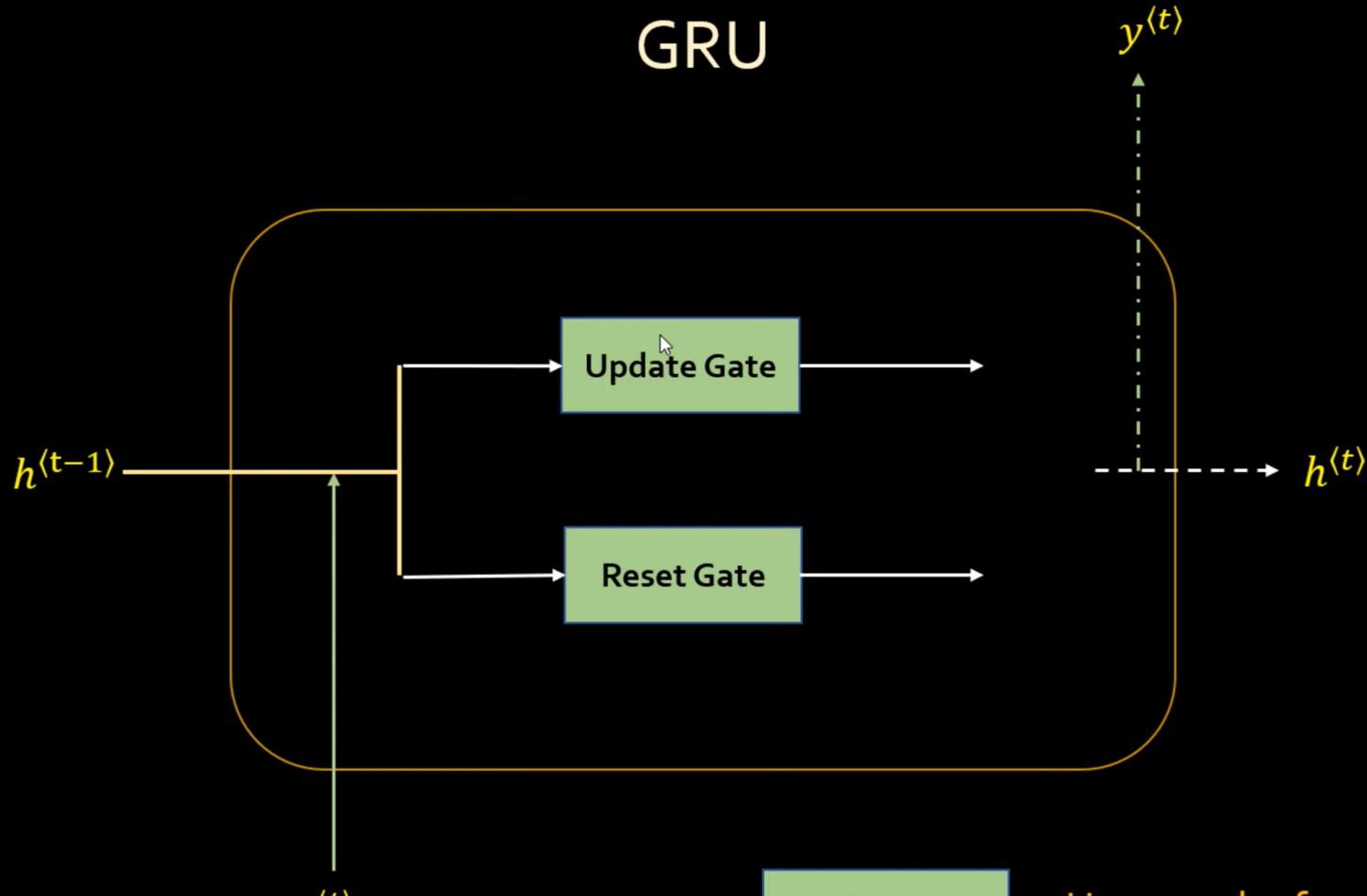
GRU



GRU



GRU



Update Gate

How much of past memory to retain

Reset Gate

How much of past memory to forget

Dhaval eats samosa almost everyday, it shouldn't be hard to guess
that his favorite cuisine is ...



Dhaval eats samosa almost everyday, it shouldn't be hard to guess
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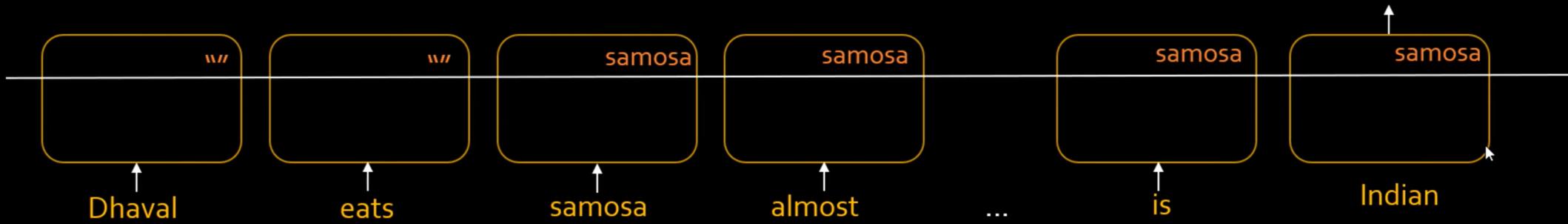


Dhaval eats samosa almost everyday, it shouldn't be hard to guess that his favorite cuisine is Indian. His brother Bhavin however is a lover of pastas and cheese that means Bhavin's favorite cuisine is ...

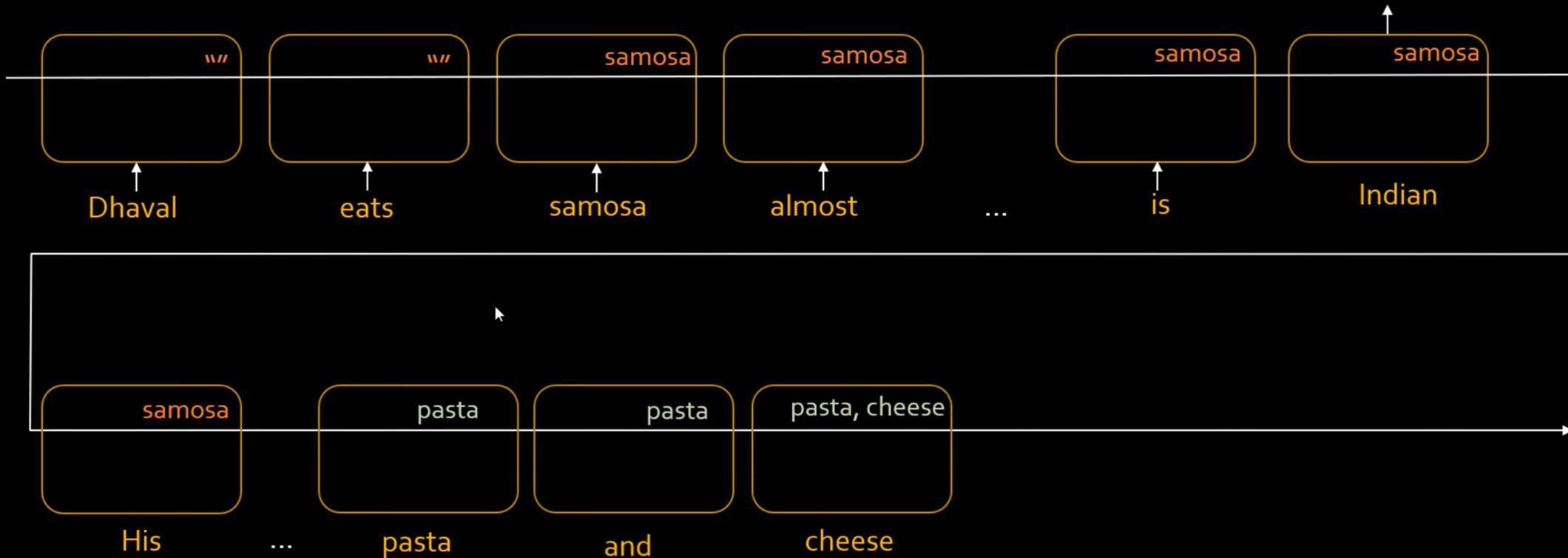
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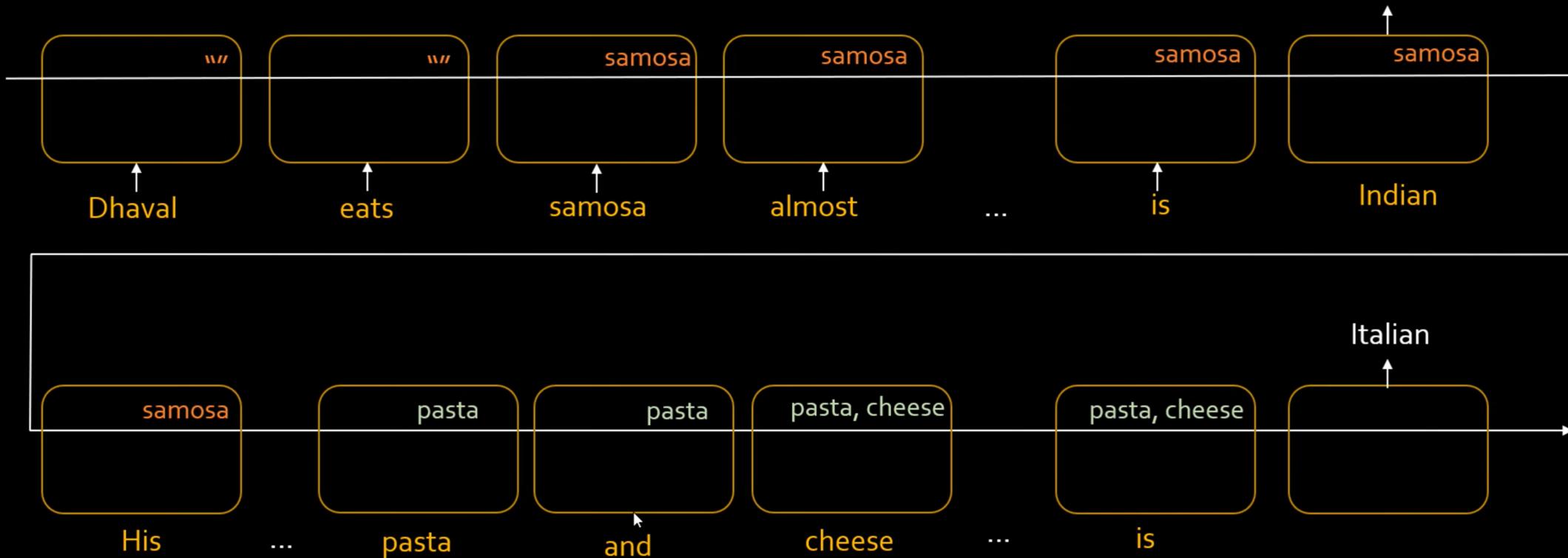
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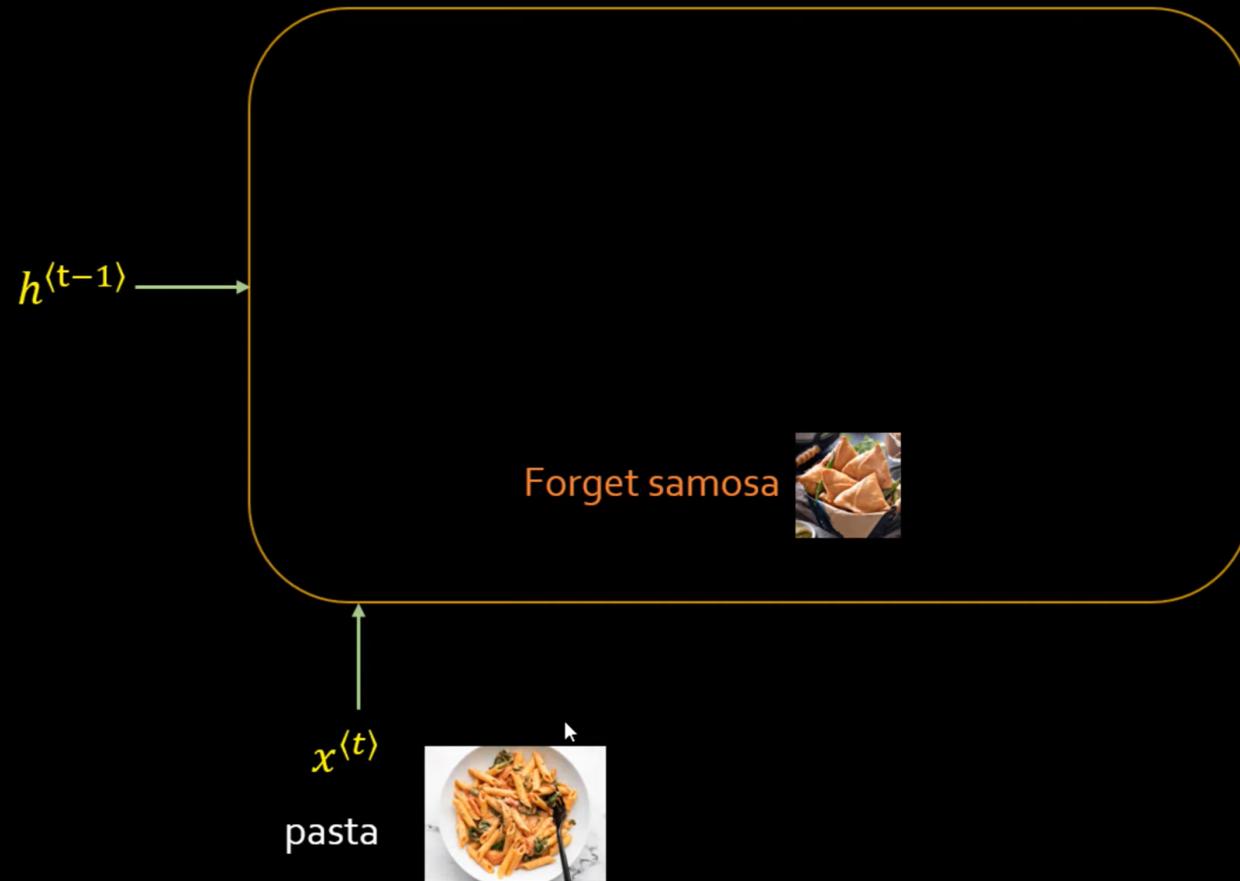
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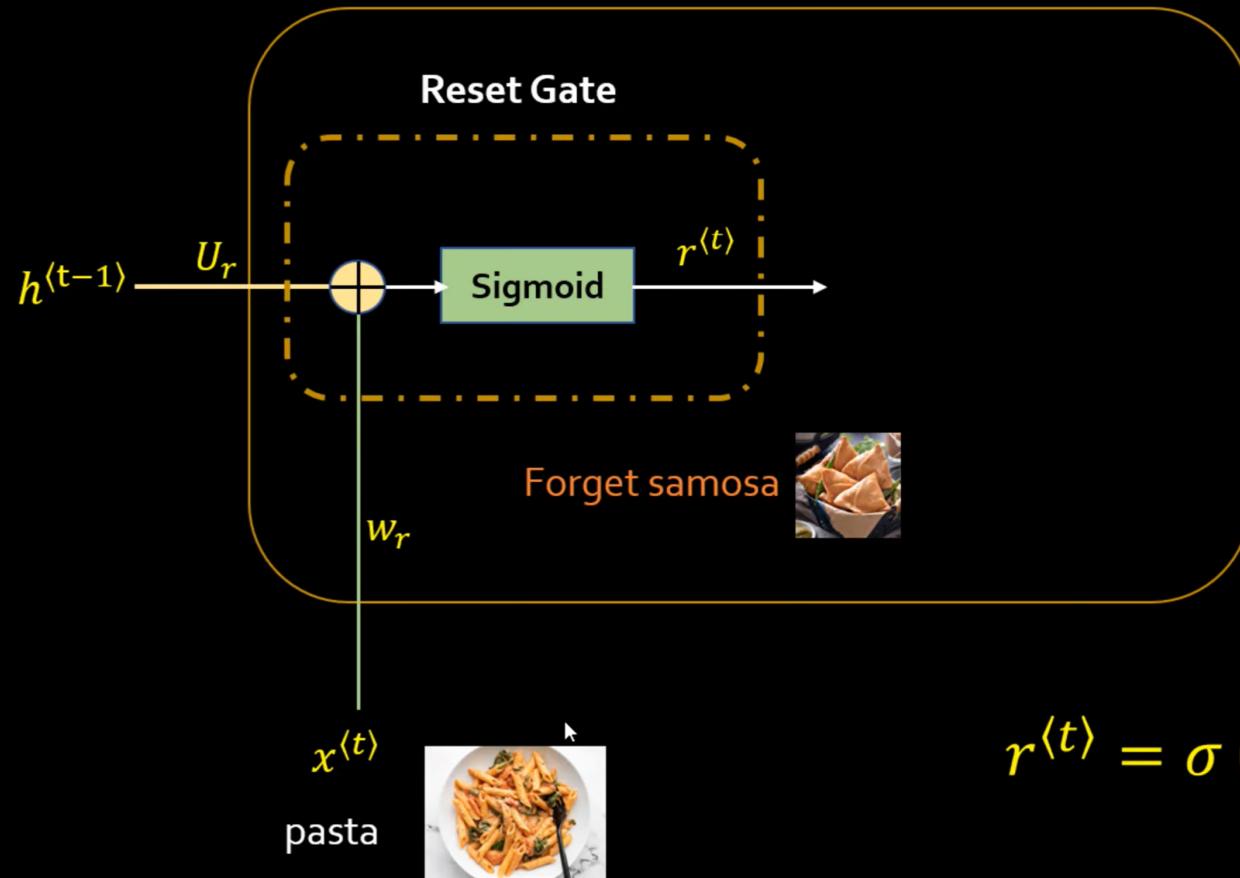
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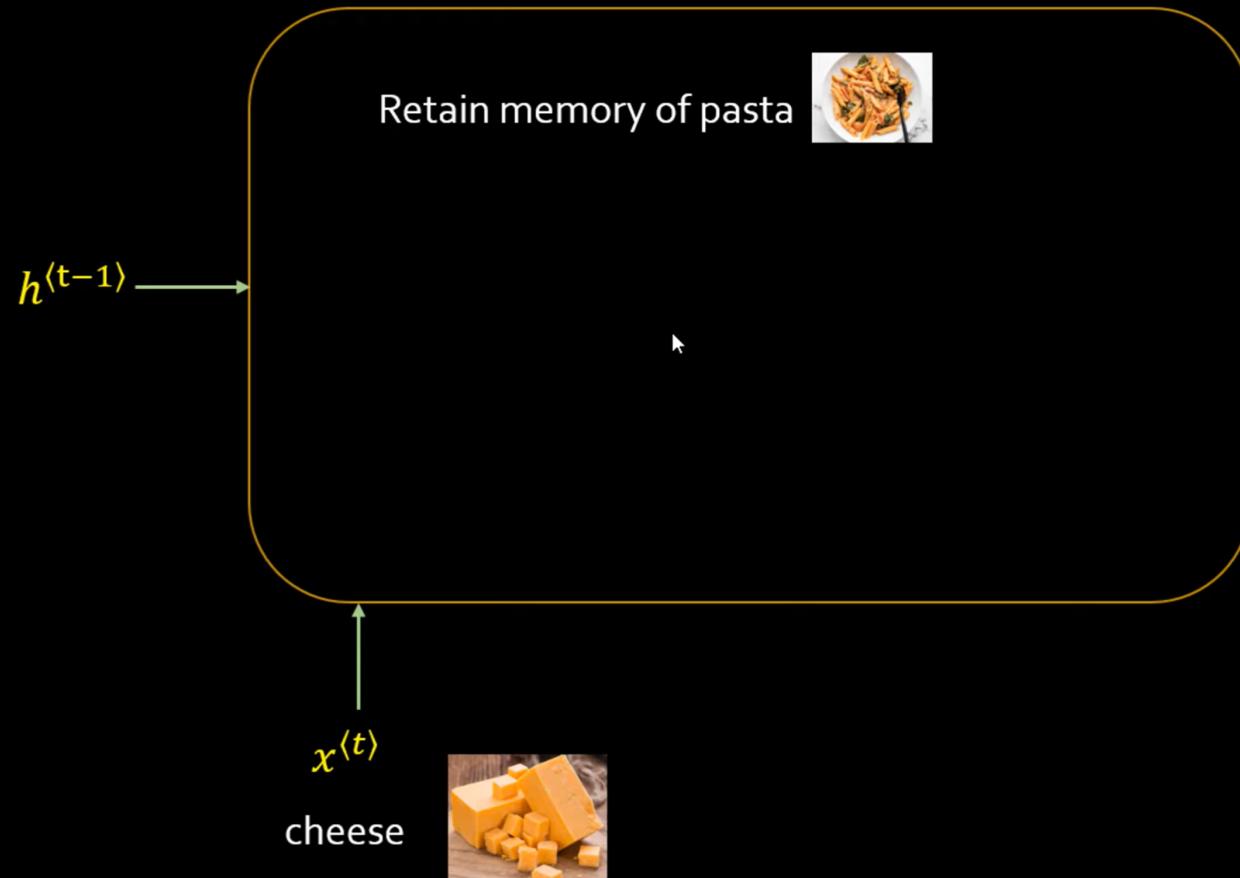


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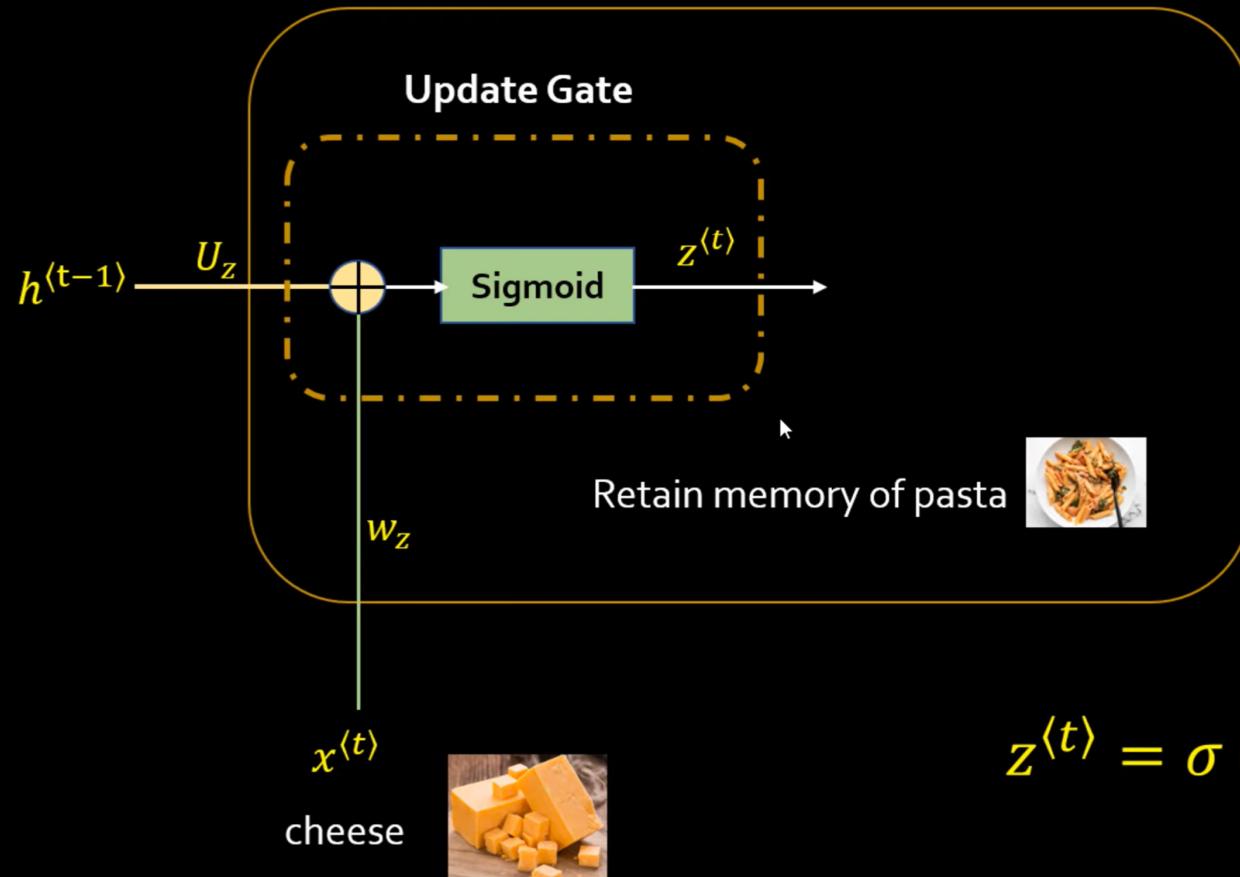


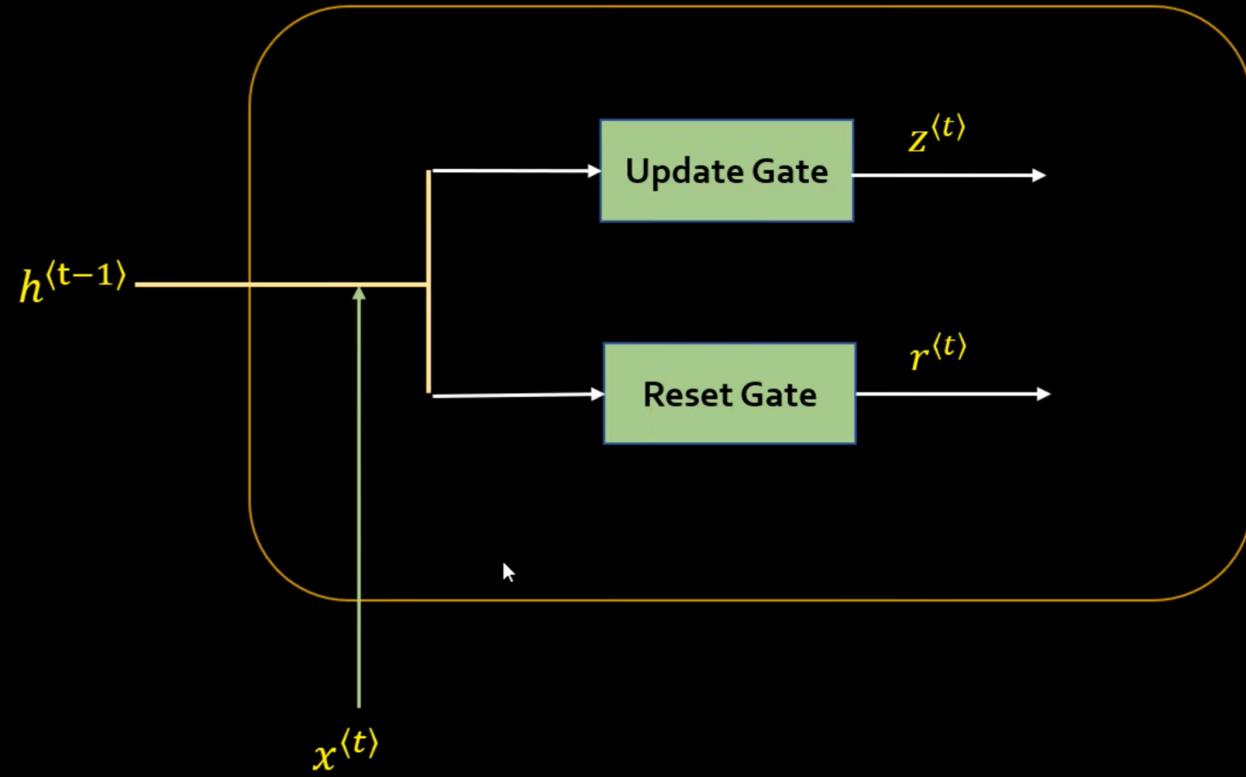
$$r^{(t)} = \sigma(w_r x^{(t)} + U_r h^{(t-1)})$$

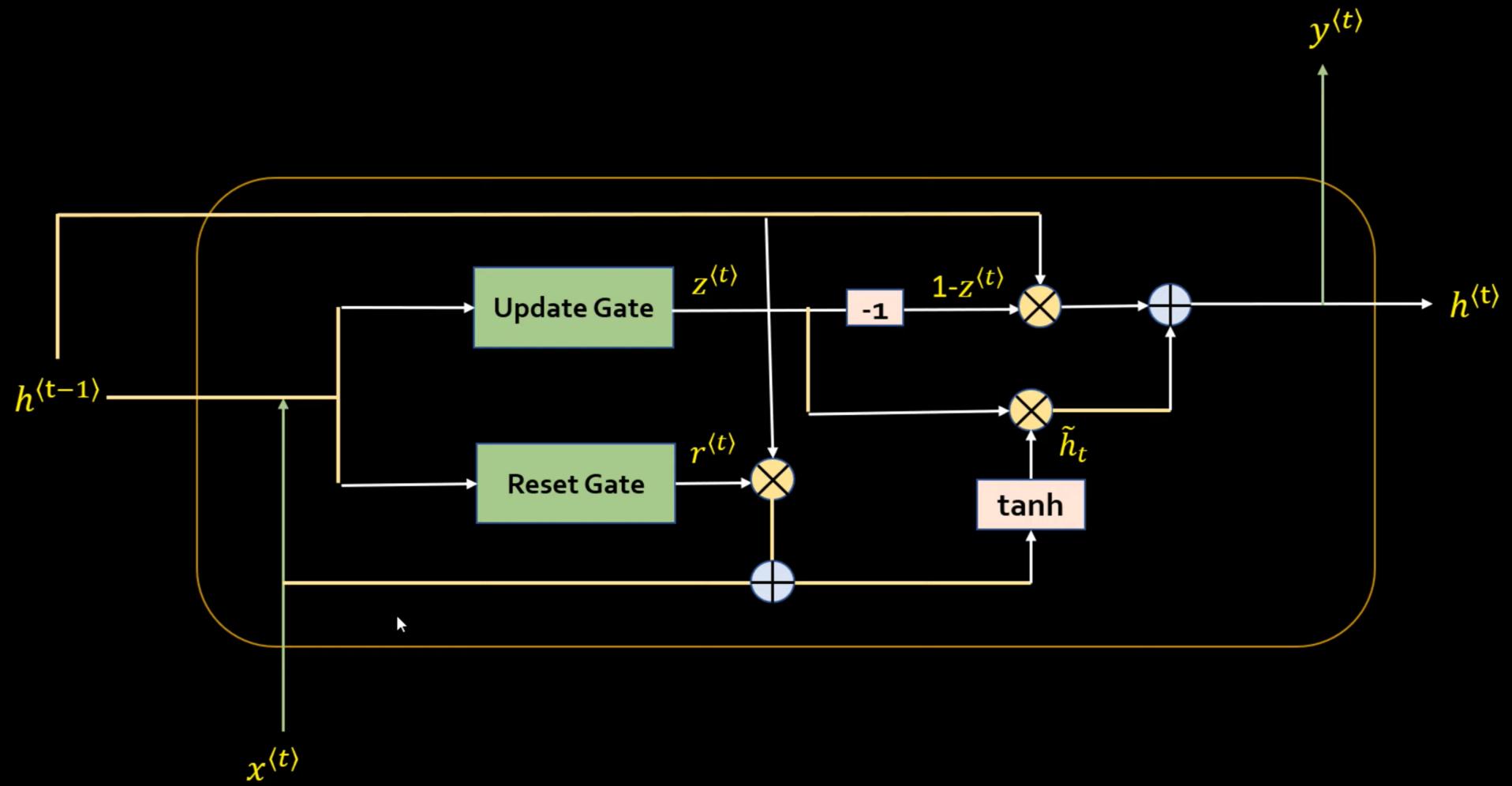
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$$z_t = \sigma_g(W_z x_t + U_z h_{t-1} + b_z)$$
$$r_t = \sigma_g(W_r x_t + U_r h_{t-1} + b_r)$$
$$\hat{h}_t = \phi_h(W_h x_t + U_h (r_t \odot h_{t-1}) + b_h)$$
$$h_t = (1 - z_t) \odot h_{t-1} + z_t \odot \hat{h}_t$$

Variables

- 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 and b : parameter matrices and vector



LSTM

3 Gates: Input, output, forget

More accurate on longer sequence,
less efficient



Invented: 1995 - 1997

GRU

2 Gates: reset, update

More efficient computation wise.
Getting more popular

Invented: 2014