

# Homework 6

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## LSTM

Forget Gate:

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

Input Gate:

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

Cell Gate:

$$g_t = \tanh(W_g[h_{t-1}, x_t] + b_g)$$

Cell State:

$$c_t = f_t * c_{t-1} + i_t g_t$$

Output Gate:

$$o_t = \sigma(W_o[h_{t-1}, x_t] + b_o)$$

Hidden State:

$$h_t = o_t * \tanh(c_t)$$

## GRU

Reset Gate:

$$r_t = \sigma(W_r[h_{t-1}, x_t] + b_r)$$

Update Gate:

$$z_t = \sigma(W_z[h_{t-1}, x_t] + b_z)$$

New Gate:

$$n_t = \tanh(W_{in}x_t + b_{in} + r_t * (W_{hn}h_{t-1} + b_{hn}))$$

Hidden State:

$$h_t = (1 - z_t) * n_t + z_t * h_{t-1}$$