Complete LSTM Forward Pass: All 6 Equations

Inputs: h_{t-1}, x_t

Cell State: C_{t-1}

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

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

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

4. $C_t = f_t \odot C_{t-1} + i_t \odot \tilde{C}_t$

CELL STATE UPDATE (Core Memory)

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

$\tanh(C_t)$

6. $h_t = o_t \odot \tanh(C_t)$

FINAL OUTPUT