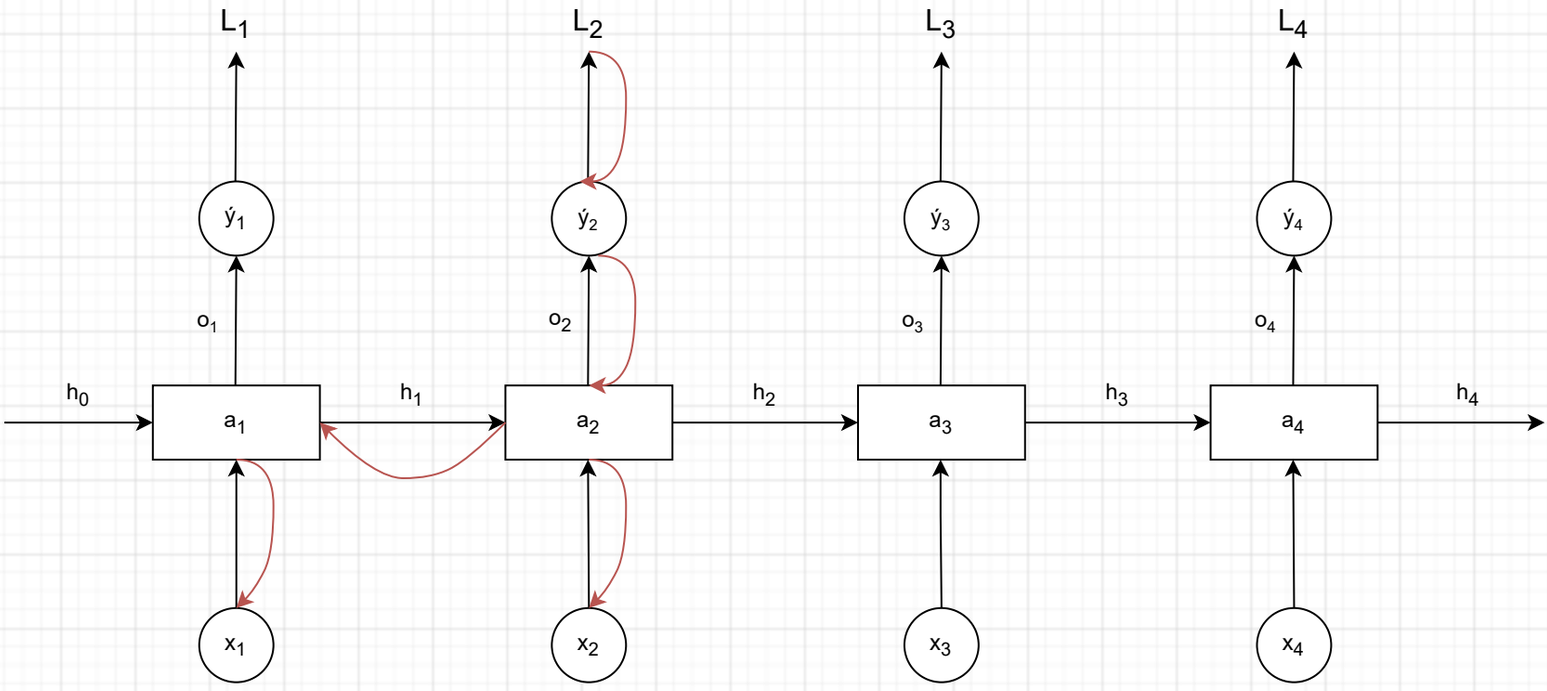


$a_t = Ux_t + Wh_{t-1} + b$

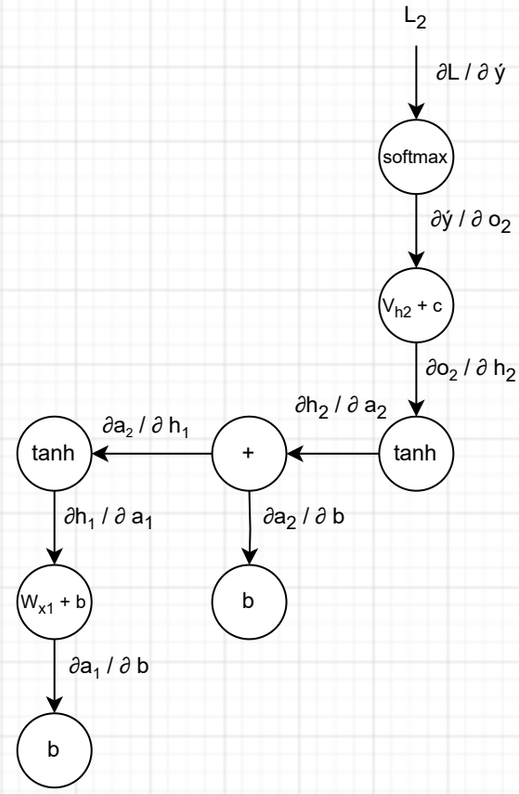
$h_t = \tanh(a_t)$

$o_t = Vh_t + c$

$\acute{y}t = \text{Softmax}(o_t)$

$L_t = CE(\acute{y}t , yt)$

$f(x) = \tanh(x) \longrightarrow f'(x) = 1 - \tanh^2(x)$



$\partial L / \partial b = (\partial L / \partial \acute{y}) * (\partial \acute{y} / \partial o_2) * (\partial o_2 / \partial h_2) * (\partial h_2 / \partial a_2) * ((\partial a_2 / \partial b) + (\partial a_2 / \partial h_1) * (\partial h_1 / \partial a_1) * (\partial a_1 / \partial b)) =$

$= (\acute{y}_2 - y_2) * V * (1 - \tanh^2(a_2))(1 + W(1 - \tanh^2(a_1)))$