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5. Gating and LSTM

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Exercises due Mar 29, 2023 08:59 -03 Completed

Gating and LSTM**Video**
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Gating

1/1 point (graded)

Recall that the most simple, single-layered RNN can be written in equation as:

$$\mathbf{s}_t = \tanh(W^{s,s}\mathbf{s}_{t-1} + W^{s,x}\mathbf{x}_t).$$

Recognize that, in the above formulation, \mathbf{s}_t is always overwritten with the calculated $\tanh(W^{s,s}\mathbf{s}_{t-1} + W^{s,x}\mathbf{x}_t)$.

Now, we introduce a gate vector \mathbf{g}_t of the same dimension as \mathbf{s}_t , which determines "how much to overwrite in the next state." In equation, a single-layered gated RNN can be written as:

$$\mathbf{g}_t = \text{sigmoid}(W^{g,s}\mathbf{s}_{t-1} + W^{g,x}\mathbf{x}_t)$$

Submit

You have used 1 of 2 attempts

LSTM

1/1 point (graded)

Which of the following components of an LSTM represent the context or state? (Choose all that apply)



Submit

You have used 1 of 2 attempts

LSTM Calculations

1/1 point (graded)

Let all the neural network's weight matrices, the hidden state, and the memory cell be $n \times 1$ vectors. Let the input x_t be a scalar. Calculate the value of the new hidden state. Round sigmoid to 0 or 1, and tanh to -1 or 1.

$$f_t = \text{sigmoid}(W^{f,h}h_{t-1} + W^{f,x}x_t) \text{ forget gate}$$

$$i_t = \text{sigmoid}(W^{i,h}h_{t-1} + W^{i,x}x_t) \text{ input gate}$$

$$o_t = \text{sigmoid}(W^{o,h}h_{t-1} + W^{o,x}x_t) \text{ output gate}$$

$$c_t = f_t \odot c_{t-1} + i_t \odot \tanh(W^{c,h}h_{t-1} + W^{c,x}x_t) \text{ memory cell}$$

$$h_t = o_t \odot \tanh(c_t) \text{ visible state}$$

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☒ 1

? [Need for gate function](#)

💬 [RNN content is literally non-existent](#)

? [hidden state?](#)

[In the last question, the network description has a "memory cell" and a "visible state", but the question asks](#)

? [Could I ask how the LSTM model does back propagation?](#)

[I was watching the video and the last part was talking about back propagation conceptually in RNN. Could n](#)

💬 [A video on LSTM: definitely to watch!](#)

[Probably one of the best visual explanation on how this works. Consider watching this as an intro to the lectu](#)

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💬 [Any other Neuroscience nerds?](#)

[Once upon a time I started going to school to be a Neuroscientist... The parallels between memory consolida](#)

💬 [Terminology in LSTM Calculation Question](#)

[Is it just me or is this question confusing? The "hidden" state and the "visible" state seem to be refering to th](#)

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