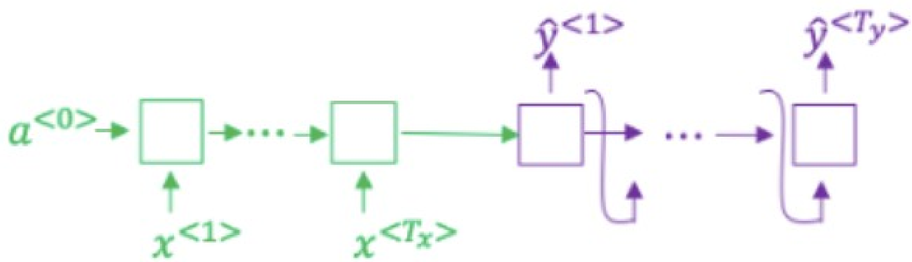
# Sequence models & Attention mechanism

Quiz, 10 questions

1. Consider using this encoder-decoder model for machine translation.




This model is a “conditional language model” in the sense that the encoder portion (shown in green) is modeling the probability of the input sentence $x$.

- True
- False

Correct

2. In beam search, if you increase the beam width $B$, which of the following would you expect to be true? Check all that apply.

- [x] Beam search will run more slowly.

Correct

- [x] Beam search will use up more memory.

Correct

- [x] Beam search will generally find better solutions (i.e. do a better job maximizing $P(y \mid x)$)

**Correct**

- [ ] Beam search will converge after fewer steps.

**Un-selected is correct**

3. In machine translation, if we carry out beam search without using sentence normalization, the algorithm will tend to output overly short translations.

- (●) True

**Correct**

- ( ) False

4. Suppose you are building a speech recognition system, which uses an RNN model to map from audio clip $x$ to a text transcript $y$. Your algorithm uses beam search to try to find the value of $y$ that maximizes $P(y \mid x)$.

On a dev set example, given an input audio clip, your algorithm outputs the transcript $\hat{y} =$ "I'm building an A Eye system in Silly con Valley.", whereas a human gives a much superior transcript $y^* =$ "I'm building an AI system in Silicon Valley."

According to your model,

$$P(\hat{y} \mid x) = 1.09 * 10^-7$$

$$P(y^* \mid x) = 7.21 * 10^-8$$

Would you expect increasing the beam width B to help correct this example?

- [x] No, because $P(y^* \mid x) \leq P(\hat{y} \mid x)$ indicates the error should be attributed to the RNN rather than to the search algorithm.

Correct

- [ ] No, because $P(y^* \mid x) \leq P(\hat{y} \mid x)$ indicates the error should be attributed to the search algorithm rather than to the RNN.
- [ ] Yes, because $P(y^* \mid x) \leq P(\hat{y} \mid x)$ indicates the error should be attributed to the RNN rather than to the search algorithm.
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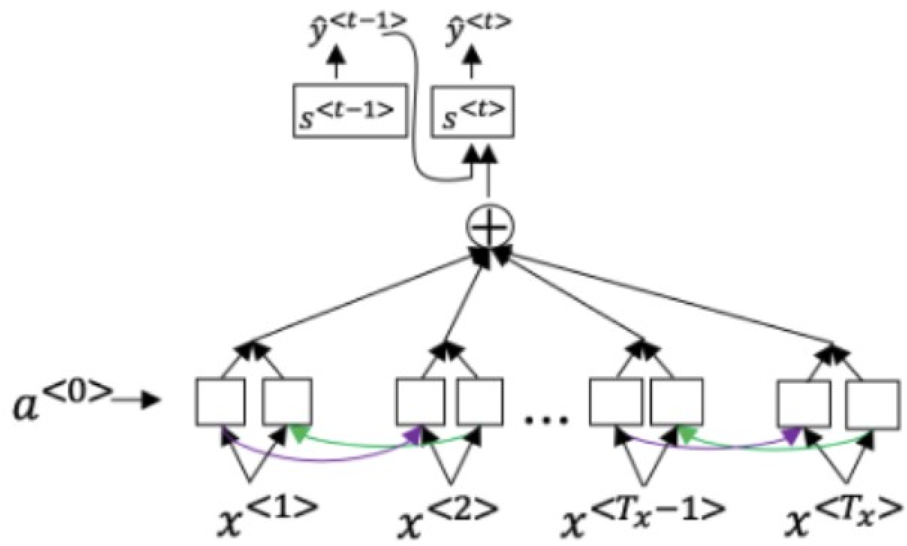
5. Continuing the example from Q4, suppose you work on your algorithm for a few more weeks, and now find that for the vast majority of examples on which your algorithm makes a mistake, $P(y^* \mid x) > P(\hat{y} \mid x)$. This suggest you should focus your attention on improving the search algorithm.

- [x] True.

Correct

- [ ] False.

6. Consider the attention model for machine translation.




Further, here is the formula for $\alpha^{<t,t'>}$.

$$\alpha^{<t,t'>} = \frac{\exp(e^{<t,t'>})}{\sum_{t'=1}^{T_x} \exp(e^{<t,t'>})}$$

Which of the following statements about $\alpha^{<t,t'>}$ are true? Check all that apply.

- [x] We expect $\alpha^{<t,t'>}$ to be generally larger for values of $a^{<t'>}$ that are highly relevant to the value the network should output for $y^{<t>}$. (Note the indices in the superscripts.)

Correct

- [ ] We expect $\alpha^{<t,t'>}$ to be generally larger for values of $a^{<t>}$ that are highly relevant to the value the network should output for $y^{<t'>}$. (Note the indices in the superscripts.)

Un-selected is correct

☐ $\sum_t \alpha^{<t,t'>} = 1$ (Note the summation is over $t$.)

**Un-selected is correct**

☒ $\sum_{t'} \alpha^{<t,t'>} = 1$ (Note the summation is over $t'$.)

**Correct**

7. The network learns where to "pay attention" by learning the values $e^{<t,t'>}$, which are computed using a small neural network:

We can't replace $s^{<t-1>}$ with $s^{<t>}$ as an input to this neural network. This is because $s^{<t>}$ depends on $\alpha^{<t,t'>}$ which in turn depends on $e^{<t,t'>}$; so at the time we need to evalute this network, we haven't computed $s^{<t>}$ yet.

◉ True

**Correct**

○ False

8. Compared to the encoder-decoder model shown in Question 1 of this quiz (which does not use an attention mechanism), we expect the attention model to have the greatest advantage when:

◉ The input sequence length $T_x$ is large.

**Correct**

○ The input sequence length $T_x$ is small.

9. Under the CTC model, identical repeated characters not separated by the “blank” character (_) are collapsed. Under the CTC model, what does the following string collapse to?

__c_oo_o_kk___b_ooooo__oo__kkk

- cokbok
- cookbook

Correct

- cook book
- coookkbooooooookkk

10. In trigger word detection, $x^{<t>}$ is:

- Features of the audio (such as spectrogram features) at time $t$.

Correct

- The $t$-th input word, represented as either a one-hot vector or a word embedding.
- Whether the trigger word is being said at time $t$.
- Whether someone has just finished saying the trigger word at time $t$.