Quiz: Recurrent Neural Networks

Congratulations! You passed!

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1. Suppose your training examples are sentences (sequences of words). Which of the following refers to the s^{th} word in the r^{th} training example?

1 / 1 point

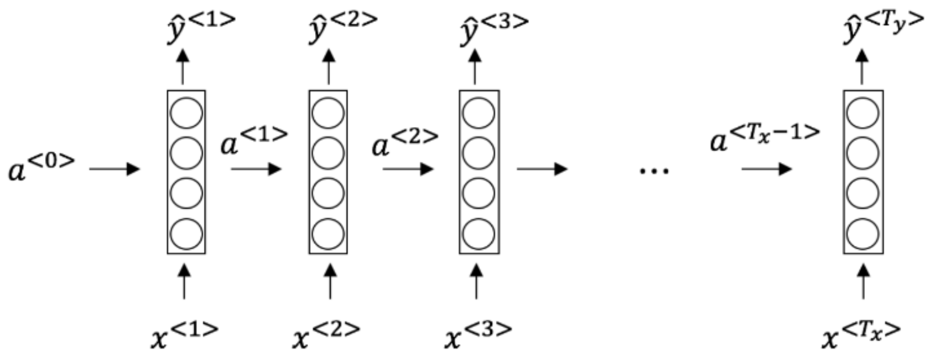
- ○ $x^{<r>(s)}$
- ◉ $x^{(r)<s>}$
- ○ $x^{(s)<r>}$
- ○ $x^{<s>(r)}$

Expand

Correct
We index into the r^{th} row first to get to the r^{th} training example (represented by parentheses), then the s^{th} column to get to the s^{th} word (represented by the brackets).

2. Consider this RNN:

1 / 1 point



True/False: This specific type of architecture is appropriate when Tx>Ty

- (●) False
- ( ) True

Expand

Correct
Correct! This type of architecture is for applications where the input and output sequence length is the same.

3. Select the two tasks combination that could be addressed by a many-to-one RNN model architecture from the following:

1 / 1 point

- ○ **Task 1:** Gender recognition from audio. **Task 2:** Image classification.
- ◉ **Task 1:** Gender recognition from audio. **Task 2:** Movie review (positive/negative) classification.
- ○ **Task 1:** Speech recognition. **Task 2:** Gender recognition from audio.
- ○ **Task 1:** Image classification. **Task 2:** Sentiment classification.

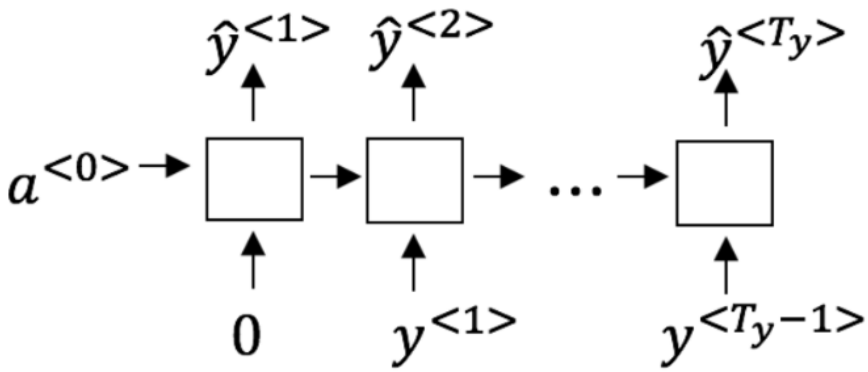
Expand

Correct

Gender recognition from audio and movie review classification are two examples of many-to-one RNN architecture

4. Using this as the training model below, answer the following:

1 / 1 point



True/False: At the t^{th} time step the RNN is estimating $P(y^{<t>})$

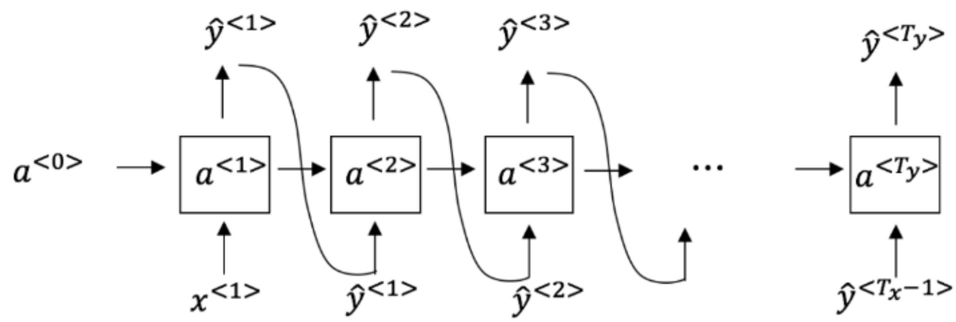
- (selected) False
- True

Expand

Correct
No, in a training model we try to predict the next steps based on the knowledge of all prior steps.

5. You have finished training a language model RNN and are using it to sample random sentences, as follows:

1 / 1 point



What are you doing at each time step t?

- ○ (i) Use the probabilities output by the RNN to pick the highest probability word for that time-step as $\hat{y}^{<t>}$. (ii) Then pass the ground-truth word from the training set to the next time-step.
- ○ (i) Use the probabilities output by the RNN to randomly sample a chosen word for that time-step as $\hat{y}^{<t>}$.(ii) Then pass the ground-truth word from the training set to the next time-step.
- ○ (i) Use the probabilities output by the RNN to pick the highest probability word for that time-step as $\hat{y}^{<t>}$.(ii) Then pass this selected word to the next time-step.
- ◉ (i) Use the probabilities output by the RNN to randomly sample a chosen word for that time-step as $\hat{y}^{<t>}$.(ii) Then pass this selected word to the next time-step.

Expand

Correct

6. You are training an RNN model, and find that your weights and activations are all taking on the value of NaN ("Not a Number"). Which of these is the most likely cause of this problem?

1 / 1 point

- ◯ Vanishing gradient problem.
- ◉ Exploding gradient problem.
- ◯ The model used the ReLU activation function to compute g(z), where z is too large.
- ◯ The model used the Sigmoid activation function to compute g(z), where z is too large.

Expand

Correct

7. Suppose you are training an LSTM. You have an 80000 word vocabulary, and are using an LSTM with 800-dimensional activations $a^{<t>}$. What is the dimension of Γ_u at each time step?

1 / 1 point

- ◯ 8
- ◉ 800
- ◯ 80000
- ◯ 100

Expand

Correct

Correct, Γ_u is a vector of dimension equal to the number of hidden units in the LSTM.

8. True/False: In order to simplify the GRU without vanishing gradient problems even when training on very long sequences you should remove the Γ_r i.e., setting $\Gamma_r = 1$ always.

0 / 1 point

- ◯ True
- ◉ False

Expand

Incorrect

No, if Γu≈0 for a timestep, the gradient can propagate back through that timestep without much decay. For the signal to backpropagate without vanishing, we need $c^{<t>}$ to be highly dependent on $c^{<t-1>}$.

9. Here are the equations for the GRU and the LSTM:

1 / 1 point

GRU

$$\tilde{c}^{<t>} = \tanh(W_c[\Gamma_r * c^{<t-1>}, x^{<t>}] + b_c)$$

$$\Gamma_u = \sigma(W_u[\, c^{<t-1>}, x^{<t>}] + b_u)$$

$$\Gamma_r = \sigma(W_r[\, c^{<t-1>}, x^{<t>}] + b_r)$$

$$c^{<t>} = \Gamma_u * \tilde{c}^{<t>} + (1 - \Gamma_u) * c^{<t-1>}$$

$$a^{<t>} = c^{<t>}$$

LSTM

$$\tilde{c}^{<t>} = \tanh(W_c[a^{<t-1>}, x^{<t>}] + b_c)$$

$$\Gamma_u = \sigma(W_u[\, a^{<t-1>}, x^{<t>}] + b_u)$$

$$\Gamma_f = \sigma(W_f[\, a^{<t-1>}, x^{<t>}] + b_f)$$

$$\Gamma_o = \sigma(W_o[\, a^{<t-1>}, x^{<t>}] + b_o)$$

$$c^{<t>} = \Gamma_u * \tilde{c}^{<t>} + \Gamma_f * c^{<t-1>}$$

$$a^{<t>} = \Gamma_o * c^{<t>}$$

From these, we can see that the Update Gate and Forget Gate in the LSTM play a role similar to _______ and ______ in the GRU. What should go in the blanks?

- (•) Γ_u and $1 - \Gamma_u$
- ( ) Γ_u and Γ_r
- ( ) $1 - \Gamma_u$ and Γ_u
- ( ) Γ_r and Γ_u

Expand

Correct

Yes, correct!

10. Your mood is heavily dependent on the current and past few days' weather. You've collected data for the past 365 days on the weather, which you represent as a sequence as $x^{<1>}, \ldots, x^{<365>}$. You've also collected data on your mood, which you represent as $y^{<1>}, \ldots, y^{<365>}$. You'd like to build a model to map from $x \rightarrow y$. Should you use a Unidirectional RNN or Bidirectional RNN for this problem?

1 / 1 point

- (selected) Unidirectional RNN, because the value of $y^{<t>}$ depends only on $x^{<1>}, \ldots, x^{<t>}$, but not on $x^{<1>}, \ldots, x^{<365>}$.
- Bidirectional RNN, because this allows backpropagation to compute more accurate gradients.
- Unidirectional RNN, because the value of $y^{<t>}$ depends only on $x^{<t>}$, and not other days' weather.
- Bidirectional RNN, because this allows the prediction of mood on day t to take into account more information.

Expand

Correct