Recurrent Neural Networks

测验, 10 questions

1 point

1.

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

- $x^{(i)<j>}$
- $x^{<i>(j)}$
- $x^{(j)<i>}$
- $x^{<j>(i)}$

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1 point

2.

Consider this RNN:

This specific type of architecture is appropriate when:

- $T_x = T_y$
- $T_x < T_y$
- $T_x > T_y$
- $T_x = 1$

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1 point

3.

To which of these tasks would you apply a many-to-one RNN architecture? (Check all that apply).

- [ ] Speech recognition (input an audio clip and output a transcript)

Sentiment classification (input a piece of text and output a 0/1 to denote positive or negative sentiment)

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Image classification (input an image and output a label)

Gender recognition from speech (input an audio clip and output a label indicating the speaker's gender)

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4.

You are training this RNN language model.

At the t^{th} time step, what is the RNN doing? Choose the best answer.

Estimating $P(y^{<1>}, y^{<2>}, \ldots, y^{<t-1>})$

Estimating $P(y^{<t>})$

Estimating $P(y^{<t>} \mid y^{<1>}, y^{<2>}, \ldots, y^{<t-1>})$

Estimating $P(y^{<t>} \mid y^{<1>}, y^{<2>}, \ldots, y^{<t>})$

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5.

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

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.

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6.
You are training an RNN, 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?

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

1 point

7.
Suppose you are training a LSTM. You have a 10000 word vocabulary, and are using an LSTM with 100-dimensional activations $a^{<t>}$. What is the dimension of Γ_u at each time step?

- 1
- 100
- 300
- 10000

1 point

8.
Here're the update equations for the GRU.

Alice proposes to simplify the GRU by always removing the Γ_u. I.e., setting Γ_u = 1. Betty proposes to simplify the GRU by removing the Γ_r. I. e., setting Γ_r = 1 always. Which of these models is more likely to work without vanishing gradient problems even when trained on very long input sequences?

- Alice's model (removing Γ_u), because if $\Gamma_r \approx 0$ for a timestep, the gradient can propagate back through that timestep without much decay.
-

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Alice's model (removing Γ_u), because if $\Gamma_r \approx 1$ for a timestep, the gradient can propagate back through that timestep without much decay.

- Betty's model (removing Γ_r), because if $\Gamma_u \approx 0$ for a timestep, the gradient can propagate back through that timestep without much decay.
- Betty's model (removing Γ_r), because if $\Gamma_u \approx 1$ for a timestep, the gradient can propagate back through that timestep without much decay.

1 point

9.

Here are the equations for the GRU and the LSTM:

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 the blanks?

- Γ_u and $1 - \Gamma_u$
- Γ_u and Γ_r
- $1 - \Gamma_u$ and Γ_u
- Γ_r and Γ_u

1 point

10.

You have a pet dog whose 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 dog's 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?

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

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