🏠 Course / Unit 3 Neural networks (2.5 weeks) / Lecture 10. Recurrent Neural Networks 1

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4. Encoding with RNN

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Encoding with RNN

Let's see now in a little bit more detail

how we can turn a sequence into a vector using

a parametric transformation.

The transformation that we can then later adjust on the basis

of what we wish to use the resulting vector of.

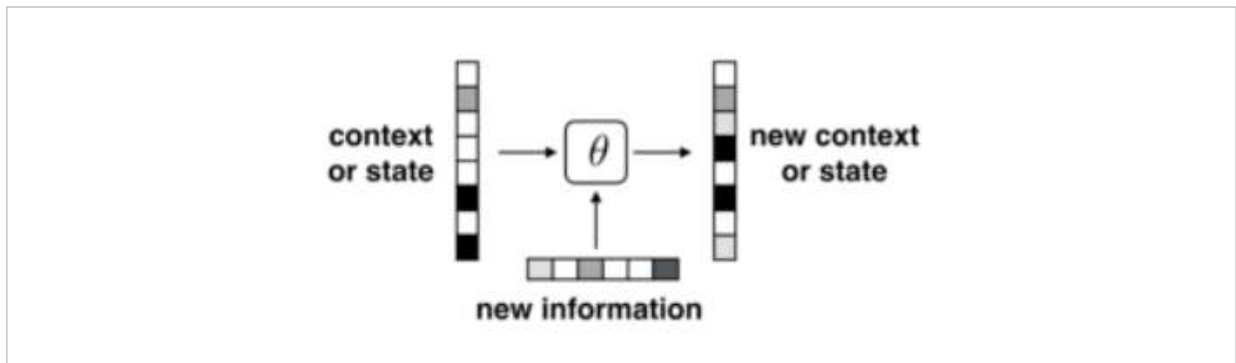| 0:00 / 0:00 | ▶ 1.25x ◀⏸ ✕ CC 66 |

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Which is Which

6/6 points (graded)
As discussed in the lecture, the following is a typical structure of a single-layered recurrent neural network.

The structure above is often expressed like the following in terms of equations:

$$s_t = \tanh\left(W^{s,s}\, s_{t-1} + W^{s,x}\, x_t\right)$$

Now, which element of the picture corresponds to s_t in the equation above?

○ context or state

○ new information

◉ new context or state

✔

Which element of the picture corresponds to x_t in the equation above?

- ( ) context or state
- (●) new information
- ( ) new context or state

✔

Which element of the picture corresponds to s_{t-1} in the equation above?

- (●) context or state
- ( ) new information
- ( ) new context or state

✔

Which of the following are "parameters" of the recurrent neural network?
(Choose all those apply.)

- [ ] s_{t-1}
- [✔] $W^{s,s}$
- [✔] $W^{s,x}$
- [ ] s_t
- [ ] x_t

✔

What is the role represented by $W^{s,x}$?

- (●) taking into account new information
- ( ) deciding what part of the previous information to keep

✔

What is the role represented by $W^{s,s}$?

- ( ) taking into account new information
- (●) deciding what part of the previous information to keep

✔

Solution:

RNN is differentiated from feed-forward neural networks in that it receives a new input x_t together with previous state s_{t-1}. s_{t-1}, s_t are states, x_t is a new input. The parameters are $W^{s,s}$, which is multiplied by the previous state vector, and $W^{s,x}$, which is multiplied by the new information.

ℹ️   Answers are displayed within the problem

Hidden State

1/1 point (graded)

For s as defined in the lecture, where s_0 is the null vector, take the sentence "Efforts and courage are not in vain". Which of the following contain(s) information about the phrase "Efforts and courage", i.e., the first three words in the sentence? (Choose all those apply.)

- ✅ s_3

- ✅ s_4

- ✅ s_5

- ⬜ s_2

✔️

Solution:

We will expect the states at time steps 3 and onward to contain information about the first three words.
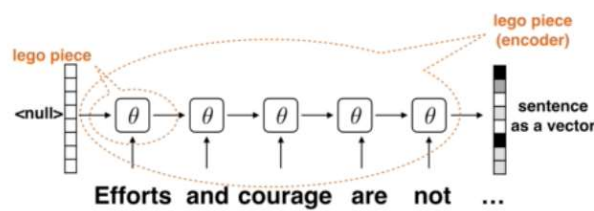
Submit   You have used 1 of 2 attempts

ℹ️   Answers are displayed within the problem

Encoding Sentences

1/1 point (graded)

Following is a graphical representation of encoding sentences with RNN.

Which of the following is true about encoding sentences with RNNs?
(Choose all those apply.)

- ✅ input is received at each layer (per word), not just at the beginning as in a typical feed-forward network

- ✅ the number of layers varies and depends on the length of the sentence

- ⬜ parameters of each layer is different

- ✅ parameters of each layer are shared

✔️

Solution:

Differences between feed-forward and recurrent neural networks were discussed in the lecture. In RNN's, input is received at each layer, unlike typical feed-forward networks. Also, usually each word of the sentence is received as an input at each layer of the RNN. Parameters, which refer to $W^{s,s}, W^{s,x}$ of the previous problem, are shared across layers.

Submit	You have used 1 of 1 attempt

ⓘ Answers are displayed within the problem

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?	**parameters?** You're not using the standard meaning for parameters of a function, i.e. all inputs to the function.	3
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💬	**Similarity and difference with Basyesian inference ?** Does it make sense to find similarities and differences with a Bayesian inference process ? Is it correct to expect that the vectors of 2 en...	2
☑	**[STAFF] Word encoding/embedding** As my understading we get word encoding from different types of features of the words e.g; gender, living, name, animal etc. But do we ...	2
☑	**Encoding Sentences - clarification of shared parameters** 4th option states "parameters of each layer are shared". My question is, shared how or by what? Does it refer to being shared among la...	2
☑	**[STAFF] Clarification with "Encoding Sentences" problem** Usually, the word "layer" is referred to one single layer in the Neural Network. Network may have several hidden transformation layers, ...	2

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