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Machine Learning with Python-From Linear Models to Deep Learning

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> 4. Encoding with RNN

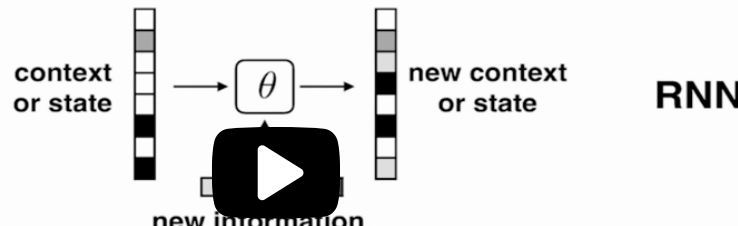
4. Encoding with RNN

Encoding with RNN

[Start of transcript. Skip to the end.](#)

 **Example: encoding sentences**

- Easy to introduce adjustable “lego pieces” and optimize them for end-to-end performance



<null>

Efforts and courage are not ...

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. We're going to be doing this by applying the same transformation in a sequence, trying to summarize a sequence into a vector piecemeal

Video

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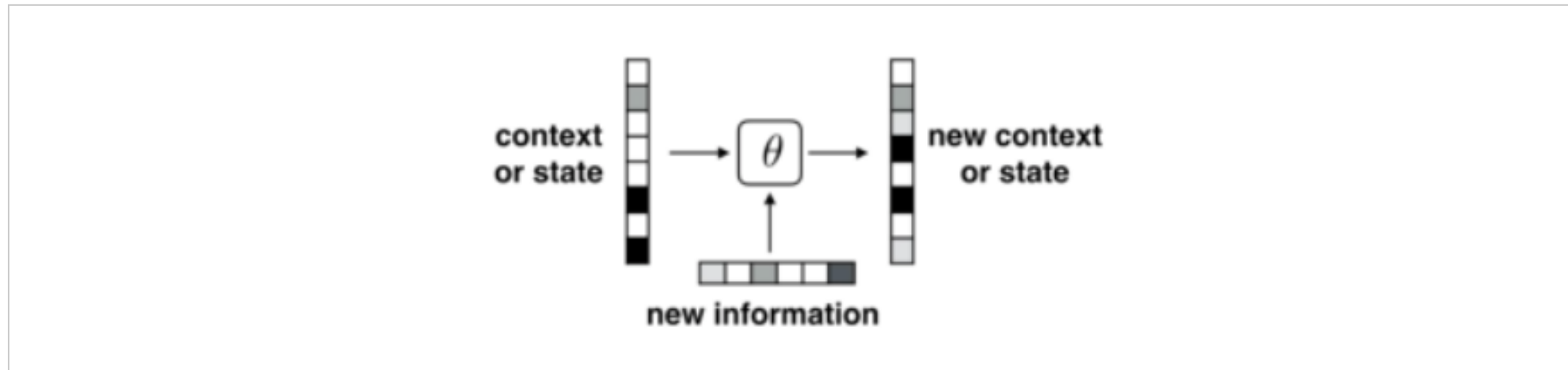
Transcripts

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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:

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

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.

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You have used 1 of 2 attempts

Answers are displayed within the problem

Hidden State

1/1 point (graded)

For s as defined in the lecture, take the sentence "Efforts and courage are not in vain". Which of the following contain(s) information about the phrase "Efforts and courage"? (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.

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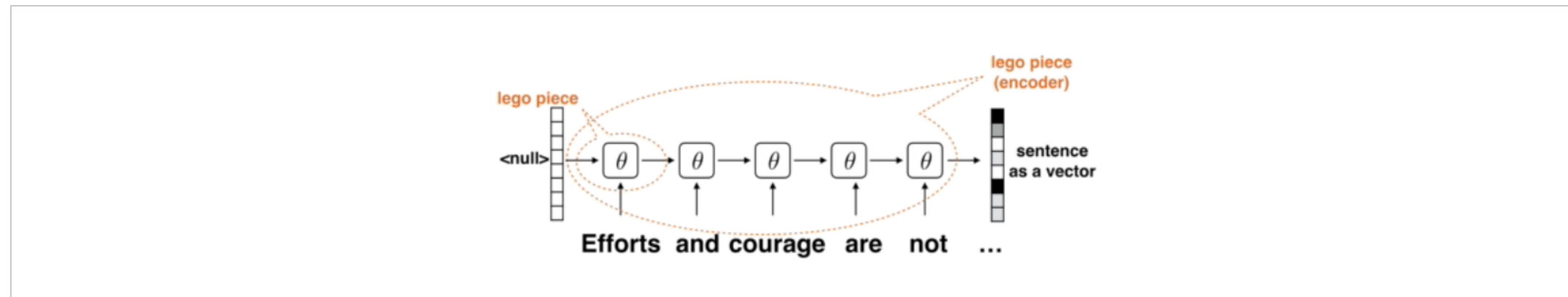
You have used 1 of 1 attempt

i 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.

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You have used 1 of 1 attempt

i Answers are displayed within the problem

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 "Hidden State" too ambiguous?

Isn't the "Hidden State" question too ambiguous?

1

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