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MITx: 6.86x

Machine Learning with Python-From Linear Models to Deep Learning

[Help](#)[sandipan_dey.](#)

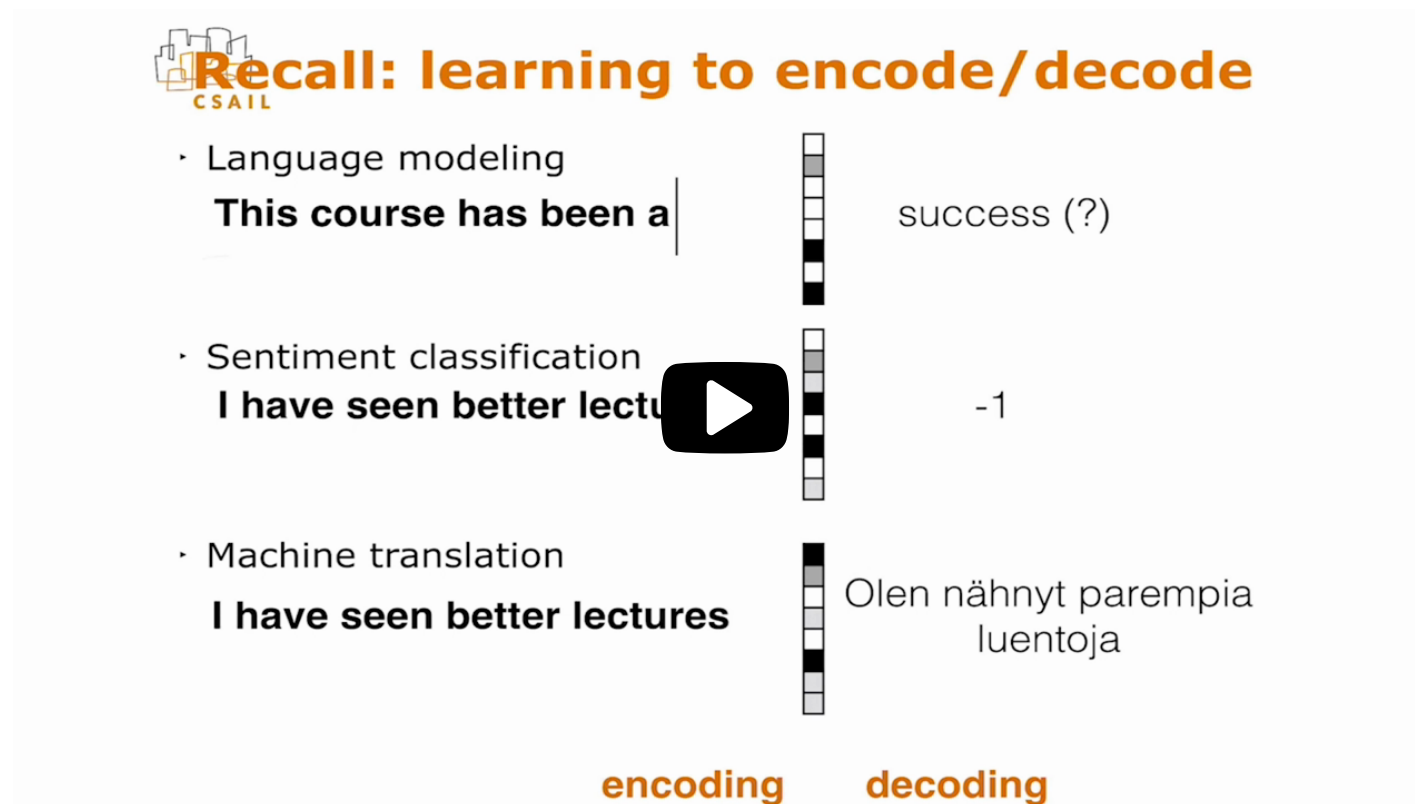
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> 1. Markov Models

1. Markov Models

Markov Models

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



The diagram illustrates the process of learning to encode and decode sequences. It features a central vertical bar with a play button icon. To the left of the bar, under the heading "Recall: learning to encode/decode" (with a CSAIL logo), are three bullet points: "Language modeling" with the example "This course has been a", "Sentiment classification" with "I have seen better lectures", and "Machine translation" with "I have seen better lectures". To the right of the bar, corresponding outputs are shown: "success (?)", "-1", and "Olen nähnyt parempia luentoja". The words "encoding" and "decoding" are written in orange at the bottom of the diagram.

0:00 / 0:00 | ▶ Speed 1.50x | 🔊 | 🗑️ | 📄 | 🗣️

Video

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Welcome back.

Today we're going to be talking about how to generate sequences using recurrent neural networks.

So if you recall what we did last time, we showed how recurrent neural networks can be used to condense a map sequences into vector

representations, and those vector representations

can then be used for all kinds of predictions,

Markov Symbols

1/1 point (graded)

To specify a Markov language model, what additional symbols do we need to add to our set of possible symbols?

☒ a start symbol ✓

☒ an end symbol ✓

☒ a symbol for unknown words ✓

☐ a symbol for complicated words



Solution:

As shown in the lecture video, we need start and end symbols in order to specify the bounds of our sentence. We also need a symbol for unknown words as there might be words in the sentence not represented in our Markov Model. Lastly, our Markov model treats words the same regardless of complexity. We're simply representing a table of transition probabilities, so there's no need to create extra symbols for complex words.

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You have used 1 of 2 attempts

i Answers are displayed within the problem

Transition Probabilities

2/2 points (graded)

		w_i				
		ML	course	is	UNK	<end>
w_{i-1}	<beg>	0.7	0.1	0.1	0.1	0.0
	ML	0.1	0.5	0.2	0.1	0.1
	course	0.0	0.0	0.7	0.1	0.2
	is	0.1	0.3	0.0	0.6	0.0
	UNK	0.1	0.2	0.2	0.3	0.2

Using a first order Markov model specified above, what is the probability of generating the following sentence <beg> ML course UNK <end>?

☒ 0.007 ✓

☐ 0.01

☐ 0.003

☐ 0.005

Which the following sentences are possible to generate? Choose all those apply.

☐ <beg> course ML is UNK <end>

☐ <beg> <end>

☐ course is ML <end>

☒ <beg> ML course <end> ✓



Solution:

For the first question,

$$P(ML | < beg >) \times P(course | ML) \times P(UNK | course) \times P(< end > | UNK) = 0.7 \times 0.5 \times 0.1 \times 0.2 = 0.007$$

. For the second question, all valid sentences must start with <beg>. The probability of the second word being <end> is zero. In addition, the probability of ML occurring after course is also zero. The correct answer is the only choice with nonzero transition probabilities at each step.

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You have used 2 of 2 attempts

i Answers are displayed within the problem

Maximum Likelihood

1/1 point (graded)

Suppose our training examples are the following three sentences.

ML courses are cool.

Humanities courses are cool.

But some courses are boring.

Using a bigram model, what is the maximum likelihood estimate for the probability that the next word is 'cool', given that the previous word is 'are'?

☒ $\frac{2}{3}$ ✓

☐ 1

☐ $\frac{1}{3}$

☐ $\frac{1}{4}$

Solution:

"are" occurs three times in the training corpus, and is followed by "cool" two out of those three times.

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You have used 1 of 2 attempts

i Answers are displayed within the problem

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Topic: Unit 3 Neural networks (2.5 weeks):Lecture 11. Recurrent Neural Networks 2 / 1. Markov Models

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Is the grader for Transition Probabilities 2nd part correct?

question posted about 11 hours ago by [sandipan dey](#).

Is the grader for Transition Probabilities 2nd part (Which the following sentences are possible to generate) correct? Can you please double check?

This post is visible to everyone.

Sarcus

about 10 hours ago - marked as answer about 9 hours ago by **Erocha** (Community TA)

Not staff, but it was correct for me. Double-check the sentences that are impossible regarding probability or that lack important and needed symbols :)

Ok i got it now, we need to see whether the structure of a sentence is valid or not ,along with its probability.

posted less than a minute ago by [sandipan dey](#).

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