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Machine Learning with Python-From Linear Models to Deep Learning

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2. Markov Models

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Markov Models

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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

Video

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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? (Choose all that apply.)

☒ 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 of the following sentences are probable 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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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

☐ $\frac{1}{3}$

☐ $\frac{1}{4}$



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Discussion




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