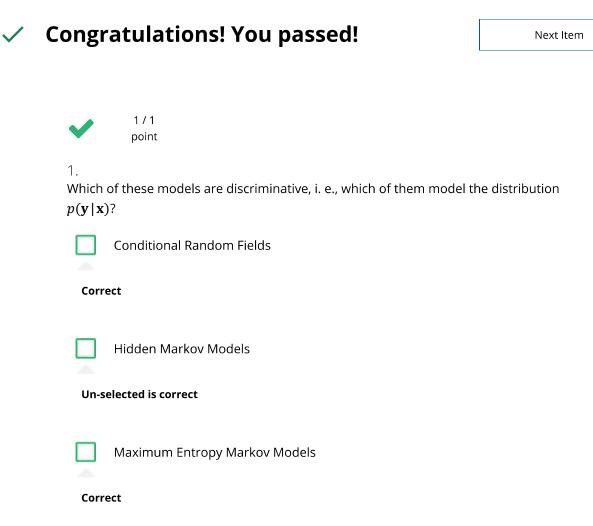
## Sequence tagging with probabilistic models Quiz, 5 questions

10/10 points (100%)



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2.

Let  $\mathbf{x}=x_1,...,x_n$  be visible words and  $\mathbf{y}=y_1,...,y_n$  be corresponding hidden tags. Find the correct formula for Hidden Markov Model:

$$p(\mathbf{y}|\mathbf{x}) = \prod_{t=1}^{T} p(y_t|y_{t-1}, x_t)$$

$$p(\mathbf{x}, \mathbf{y}) = p(\mathbf{y} | \mathbf{x}) p(\mathbf{x}) = \prod_{t=1}^{T} p(x_t | x_{t-1}) p(y_t | x_t)$$

$$p(\mathbf{x}, \mathbf{y}) = \prod_{t=1}^{T} p(x_t | x_{t-1}) p(y_t | y_{t-1})$$

Correct

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3.		
Find the correct statements about Viterbi algorithm.		
	Viterbi algorithm can find dynamically the most probable sequence of hidden tags in $O(N^2T)$ operations. The brute force search of this solution would take an exponential time on $T$ .	
Corre	ect	
	Viterbi algorithm has exponential time complexity.	
Un-selected is correct		
	At each time step of the Viterbi algorithm, for each state the probability of the best tag sequence ending in this state is computed. This probability is estimated using the similar probabilities from the previous step and the current word.	
Correct		
	At the $t$ -th time step of Viterbi algorithm we just choose the state $y_t$ such that the value $p(y_t y_{t-1})p(x_t y_t)$ is maximal. We do not take into account best paths computed at the previous steps.	
Un-selected is correct		

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4. Consider a Hidden Markov Model with three hidden states: N (noun), V (verb (other). Let all transitions between states be equiprobable. Consider the follopossible outputs:		
N: mimsy   borogoves		
V: were   borogoves		
O: All   mimsy   the		
Let all these outputs be also equiprobable.		
Consider the sentence "All mimsy were the borogoves" and choose the correstatement.	ect	
There are four possible best tag sequences: ONVON, ONVOV, OOVO OOVOV. All of them are equiprobable.	N,	
The best tag sequence is OOVON.		
The best tag sequence is ONVOV.		
There are two possible best tag sequences: ONVON and ONVOV. The equiprobable.	ey are	
<b>Correct</b> Exactly! It's easier to generate "mimsy" from a noun than from a verb, so these two sequences are more probable than OOVON or OOVOV.		
The best tag sequence is OOVOV.		
The best tag sequence is ONVON.		

4/4 points

5.

4 di 5 26/04/2019, 19:44 As before, consider a Hidden Markov Model with three hidden states: N (noun), V Sequence tagging with probabilistics model states be equiprobable. Consider the probabilistic following possible outputs:

N: mimsy | borogoves

V: were | borogoves

O: All | mimsy | the

Let all these outputs be also equiprobable.

**The probability** p **(V | O)** of a transition from O to V is  $\frac{1}{3}$  in this model. Let's reestimate it on the sentence "*All mimsy were the borogoves*" using one iteration of Baum-Welch algorithm.

Find the new value of this probability and write it with **precision of 3 digits** after the decimal point.

<u>Hint:</u> there are four possible tag sequences: ONVON, ONVOV, OOVON, OOVOV. The first and the second sequences have the same probability, and so do the third and the fourth ones. You need to estimate these probabilities and find the ratio of the expectations for (O -> V) and (O->?) transition counts.

0.375

**Correct Response** 

You got it!

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