



Probabilistic Graphical Models

Daphne Koller, Kevin Murphy
Winter 2011-2012

[Home](#)
[Quizzes](#)
[Theory Problems](#)
[Assignments](#)
[Assignment Questions](#)
[Video Lectures](#)
[Discussion Forums](#)
[Octave Installation](#)
[Lecture Slides](#)
[Course Schedule](#)
[Course Logistics](#)
[Course Information](#)
[Course Staff](#)

Feedback — Template Models

You achieved a score of **6.75** out of **7.00**

Please check our grading policy under "Course Logistics" before submitting the quiz. The quiz is timed - you can save your answers halfway and come back again later.

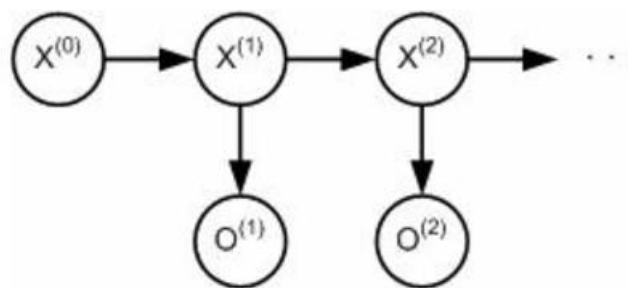
Question 1

Markov Assumption. If a dynamic system X satisfies the Markov assumption for all time $t \geq 0$, which of the following statements must be true?


Your Answer		Score	Explanation
<input type="radio"/> $(X^{(t+1)} \perp X^{(0:t-1)})$	✓	0.33	
<input type="radio"/> $(X^{(t+1)} \perp X^{(t)})$	✓	0.33	
<input checked="" type="radio"/> $(X^{(t+1)} \perp X^{(0:t-1)} X^{(t)})$	✓	0.33	
Total		1.00	

Question 2

Independencies in DBNs. In the following DBN, which of the following independence assumptions is true?







Your Answer		Score	Explanation
<input type="radio"/> $(O^{(t)} \perp X^{(t-1)} X^{(t)})$	✗	0.00	When $X^{(t)}$ is known, there is no active trail from $O^{(t)}$ to any other node in the network.
<input checked="" type="radio"/> $(X^{(t-1)} \perp X^{(t+1)} X^{(t)})$	✓	0.25	When $X^{(t)}$ is known, there is no active trail from $X^{(t-1)}$ to any other node in the network that is from a later time point.
<input checked="" type="radio"/> $(O^{(t)} \perp O^{(t-1)} X^{(t)})$	✓	0.25	When $X^{(t)}$ is known, there is no active trail from $O^{(t)}$ to any other node in the network.

<input type="radio"/> $(O^{(t)} \perp O^{(t-1)})$		0.25	$(O^{(t)} \perp O^{(t-1)})$ is wrong because there is an active path from $O^{(t)}$ to $O^{(t-1)}$ through $X^{(t)}$ and $X^{(t-1)}$.
Total		0.75	




Question 3


Applications of DBNs. For which of the following applications might one use a DBN (i.e. the Markov assumption is satisfied)? (You may select more than one option.)

Your Answer	Score	Explanation
<input checked="" type="checkbox"/> Modeling time-series data, where the events at each time-point are influenced by only the events at the one time-point directly before it	 0.25	This perfectly satisfies the Markov assumption.
<input checked="" type="checkbox"/> Modeling the behavior of people, where a person's behavior is influenced by only the behavior of people in the same generation and the people in his/her parents' generation.	 0.25	Consider each generation to be a time-slice, and this data satisfies the Markov assumption.
<input type="radio"/> Modeling data taken at different locations along a road, where the data at each location is influenced by the data at many other locations.	 0.25	The data at each location is not independent of the data at other locations, given the data at one location away in any direction, so Markov assumption is violated.
<input type="radio"/> Modeling time-series data, where the events at each time-point are influenced by the events at many other time-points.	 0.25	This violates the Markov assumption because knowing the events at the time point right before a given time point is not sufficient to understand the events at the given time-point
Total	1.00	

Question 4

Plate Semantics. "Let A and B be random variables inside a common plate indexed by i. Which of the following statements must be true? You may select more than one option.

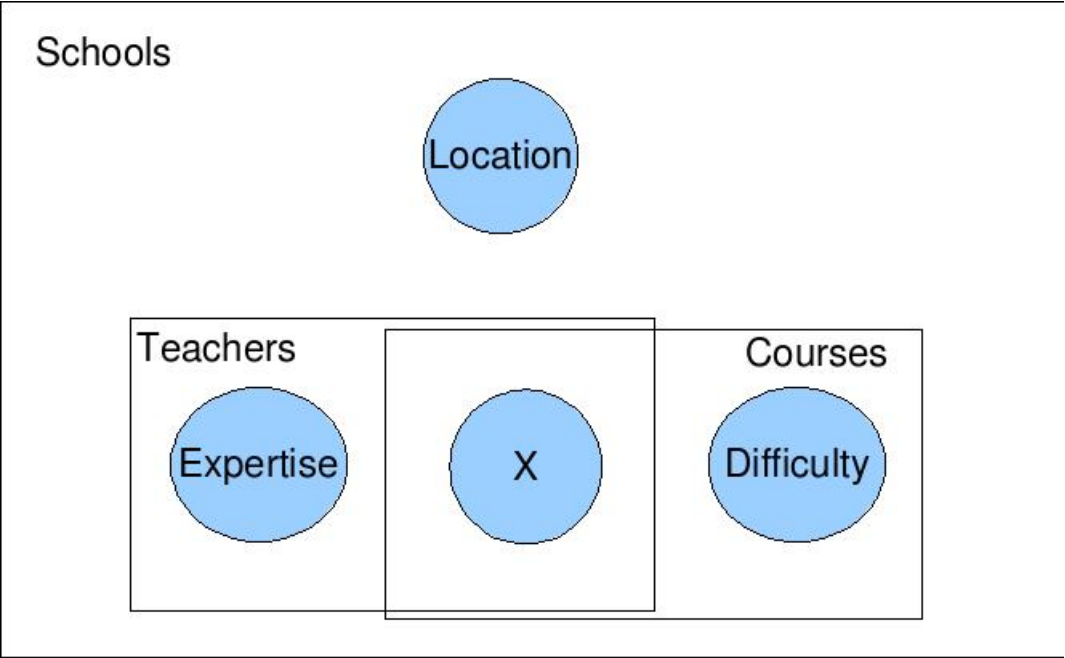
Your Answer	Score	Explanation
<input checked="" type="checkbox"/> There is an instance of A and an instance of B for every i.	 0.25	
<input type="radio"/> For each i, A(i) and B(i) are independent.	 0.25	
<input type="radio"/> For each i, A(i) and B(i) have the same CPDs.	 0.25	The CPDs may not be the same for every item. Think about courses as items, with A representing your grade in class and I representing the overall class performance. The CPDs for A and I do not have to be the same for every course.





☐ For each i , $A(i)$ and $B(i)$ are not independent.  0.25

Total 1.00

Question 5

***Plate Interpretation.** Consider the plate model below (with edges removed). Which of the following might a given instance of X possibly represent in the grounded model? (You may choose more than one option. Keep in mind that this question addresses the variable's semantics, not its CPD.)



Your Answer	Score	Explanation
<input type="radio"/> None of these options can represent X in the grounded model  0.20	0.20	At least one option could represent X .
<input type="radio"/> Whether someone with expertise E taught something of difficulty D at school S  0.20	0.20	In the grounded model, there will be an instance of X for each combination of Teacher and Class, and there is a combination I this for each School. Thus, we are looking at a random variable that will say something about a specific teacher, class, and school combination, not a particular expertise, difficulty, and school combination.
<input checked="" type="radio"/> Whether a specific teacher T taught a specific course C at school S  0.20	0.20	In the grounded model, there will be an instance of X for each combination of Teacher, Course, and School. Thus, we are looking at a random variable that will say something about a specific teacher, class, and school combination. The correct answer is only one that does this.
<input type="radio"/> Whether a teacher with  0.20	0.20	In the grounded model, there will be an instance of X for each combination of Teacher and Class, and there is a combination I

Feedback		
expertise E taught a course of difficulty D		this for each School. Thus, we are looking at a random variable that will say something about a specific teacher and class and we also incorporate the school.
<input type="radio"/> Whether a specific course C is boring	<input checked="" type="checkbox"/> 0.20	In the grounded model, there will be an instance of X for each combination of Teacher and Class, and there is a combination I this for each School. Thus, this model also incorporates teacher and schools.
Total	1.00	

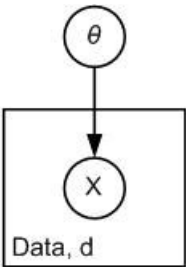
Question 6

Grounded Plates. Using the same plate model, now assume that there are s schools, t teachers, and c courses. How many instances of the Location variable are there?

Your Answer	Score	Explanation
<input checked="" type="radio"/> s	<input checked="" type="checkbox"/> 1.00	There is a variable for every school.
Total	1.00	

Question 7




Grounded Plates. Which of the following is a valid grounded model for the plate shown? You may select 1 or more options (or none of them, if you think none apply).



(a)

(b)

(c)

Your Answer	Feedback	
	Score	Explanation
<input type="radio"/> (b)	 0.33	(b) is incorrect because there are no arrows connecting nodes within the plate.
<input checked="" type="radio"/> (c)	 0.33	(c) is correct because θ is outside the plate and has edges from it to the nodes in the plate, and none of the nodes within the plate share edges with each other.
<input type="radio"/> (a)	 0.33	(a) is incorrect because only the variables in the plate get replicated when the plate model is grounded, and θ is not in the plate.
Total	1.00	