Template Models

Help

Warning: The hard deadline has passed. You can attempt it, but **you will not get credit for it**. You are welcome to try it as a learning exercise.

Please check our grading policy under "Course Logistics" before submitting the quiz. The quiz isn't timed - you can save your answers halfway and come back again later.

- [ ] **In accordance with the Coursera Honor Code, I (Mike Ryan) certify that the answers here are my own work.**

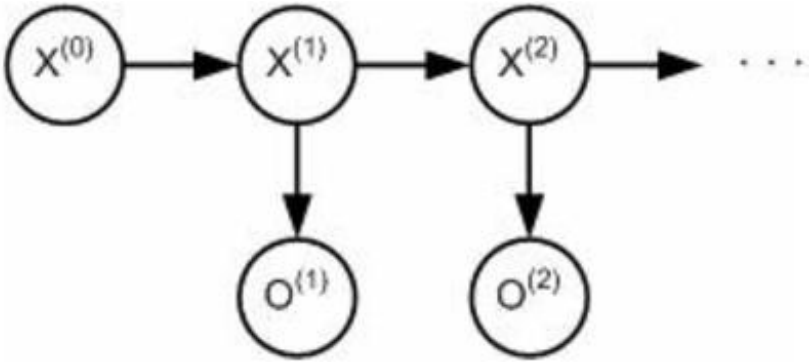
Question 1

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? You may select 1 or more options (or none of them, if you think none apply).

- [ ] $(X^{(t+1)} \perp X^{(0:(t-1))} | X^{(t)})$
- [ ] $(X^{(t+1)} \perp X^{(t)})$
- [ ] $P(X^{(t+1)}) \times P(X^{(0:(t-1))}) = P(X^{(t)})$ for all possible values of X

Question 2

Independencies in DBNs. In the following DBN, which of the following independence assumptions are true? You may select 1 or more options (or none of them, if you think none apply).



- [ ] $(O^{(t)} \perp X^{(t-1)} \mid X^{(t)})$
- [ ] $(O^{(t)} \perp O^{(t-1)} \mid X^{(t)})$
- [ ] $(O^{(t)} \perp O^{(t-1)})$
- [ ] $(X^{(t-1)} \perp X^{(t+1)} \mid X^{(t)})$

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 1 or more options (or none of them, if you think none apply).

- [ ] 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
- [ ] Modeling time-series data, where the events at each time-point are influenced by the events at many other time-points.
- [ ] 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.
- [ ] Modeling data taken at different locations along a road, where the data at each location is influenced by the data at many other locations.

Question 4

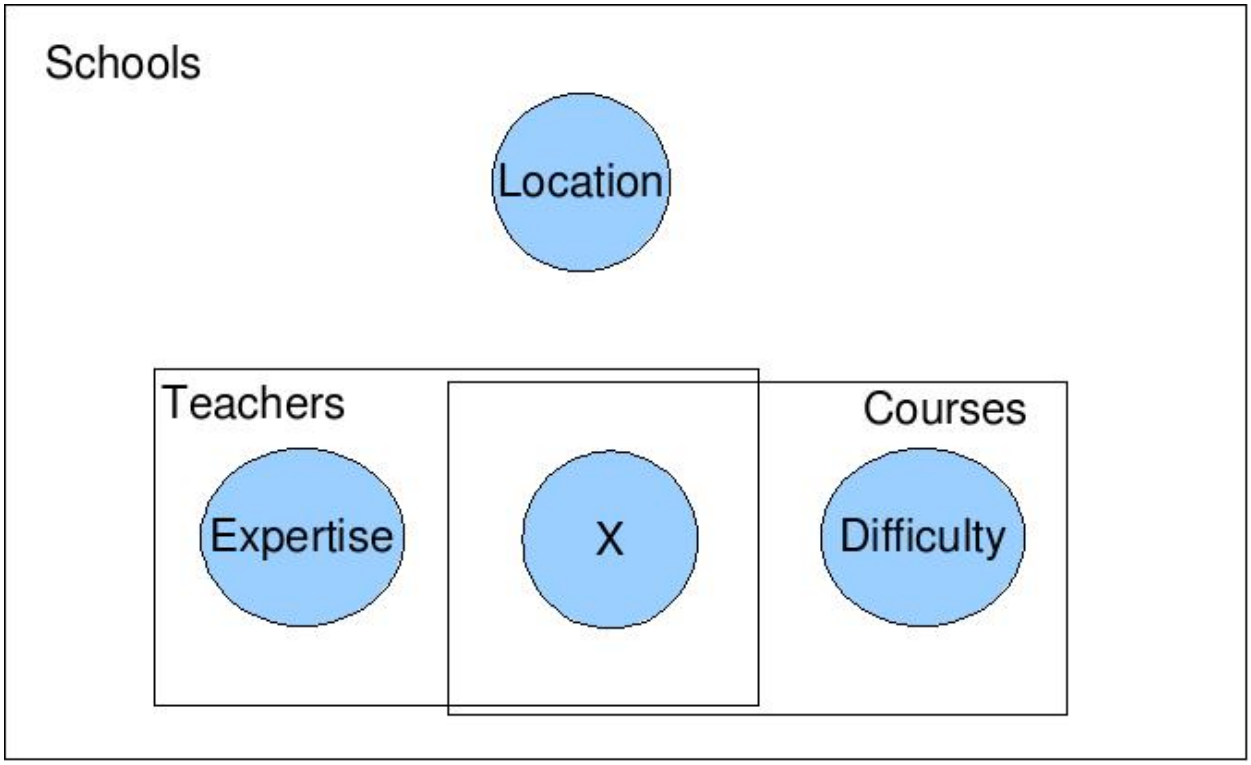
Plate Semantics. "Let A and B be random variables inside a common plate indexed by i. Which of the following statements must be true? You may select 1 or more options (or none of them, if you think none apply).

- [ ] For each i, A(i) and B(i) have the same CPDs.

- [ ] There is an instance of A and an instance of B for every i.
- [ ] For each i, A(i) and B(i) are not independent.
- [ ] For each i, A(i) and B(i) are independent.

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 select 1 or more options or none of them, if you think none apply. Keep in mind that this question addresses the variable's semantics, not its CPD.)



- [ ] Whether a specific course C is boring
- [ ] None of these options can represent X in the grounded model
- [ ] Whether someone with expertise E taught something of difficulty D at school S
- [ ] Whether someone with expertise E taught something of difficulty D at a place in location L
- [ ] Whether a specific teacher T taught a specific course C at school S

Question 6

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

- ct
- s
- stc
- t

In accordance with the Coursera Honor Code, I (Mike Ryan) certify that the answers here are my own work.

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You cannot submit your work until you agree to the Honor Code. Thanks!