51:52

22AIE301_Quiz (Copy)

Hi, S GIRISH. When you submit this form, the owner will see your name and email address.

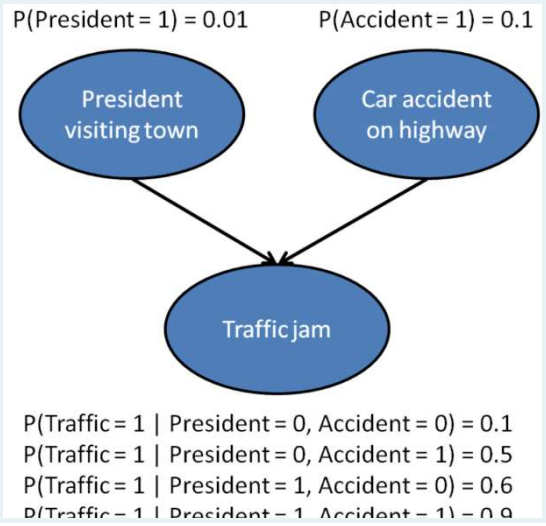
1

Let I(G) be the set of independencies encoded by a graph G. Consider this definition: Then G_1 is an I-map for G_2 if I(G_1) is a subset of I(G_2). Which of the following statements about I-maps are true? (2 Points)

- The graph K that is the same as graph G, except that all edges are oriented in the opposite direction as corresponding edges in G, is always an I-map for G, regardless of structure of G
- A graph K is an I-map for graph G if and only if all of the independencies encoded by K are also encoded by G
- A graph K is an I-map for graph G if and only if the graphs have the same nodes and edges
- An I-map maps a graph G to itself

2

Consider the model for traffic jam in a town which can be caused either by a car accident or a visit by the president and find the value of P(Accident=1 | Traffic=1, President=1) rounded to two decimal places. (10 Points)

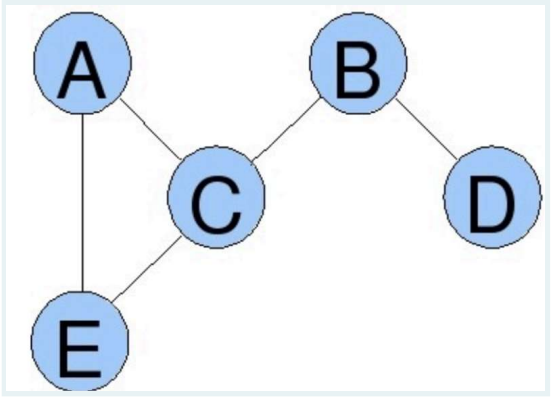


- 0.23
- 0.54
- 0.76

- ○ 0.14

3

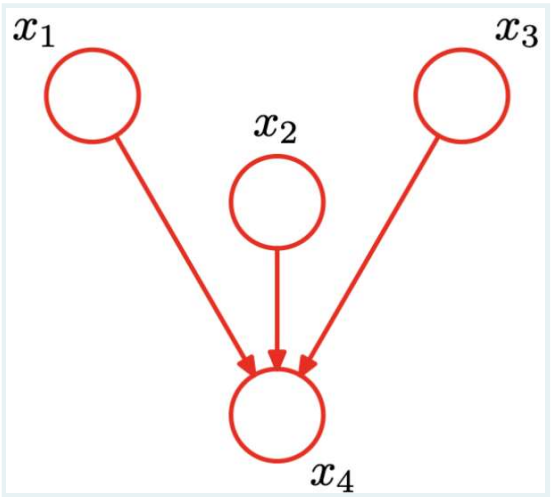
In this undirected model, which pairs of variables are independent when no variables are observed? (3 Points)



- ○ A, D
- ◉ B, E
- ○ A, B
- ○ No pairs are independent

4

The moral graph corresponding to the given graph (2 Points)



- ○ Has new edges between x_1 and x_2, x_2 and x_3, & x_1 and x_3
- ◉ Has new edges between x_1 and x_2 & x_2 and x_3 only
- ○ Is the same as the given graph
- ○ Has new edges between x_2 and x_3 & x_1 and x_3 only

5

(3 Points)

Factors in Markov Network. Let $\pi_1[A, B]$, $\pi_2[B, C]$, and $\pi_3[A, C]$ be all of the factors in a particular undirected graphical model. Then what is $\sum_{A,B,C} \pi_1[A, B] \times \pi_2[B, C] \times \pi_3[A, C]$? More than one answer could be correct.

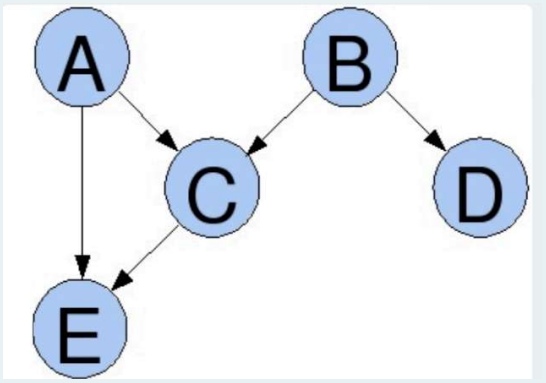
Please select 2 options.

- [ ] Always greater than or equal to pi_1[a,b]*pi_2[b,c]*pi_3[a,c], where a, b, c, are particular values of A, B, C
- [ ] Equal to 1
- [x] Equals partition function Z
- [ ] Always less than or equal to pi_1[a,b]*pi_2[b,c]*pi_3[a,c], where a, b, c, are particular values of A, B, C
- [x] Always greater than or equal to 1

6

How many independent parameters are required to uniquely specify the conditional distribution of C given it's parents in the model here, if A, B, D are binary, and C, E have 3 values each?

(3 Points)



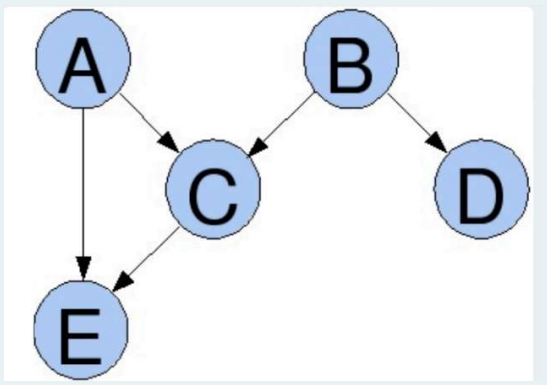
- ( ) 6
- (•) 12
- ( ) 8

11

7

Assume E is observed but A, B, C, and D are not observed. Which pairs of variables (not including E) are independent in the model, given E?

(2 Points)



A, B

A, C

None - no independent variables given E

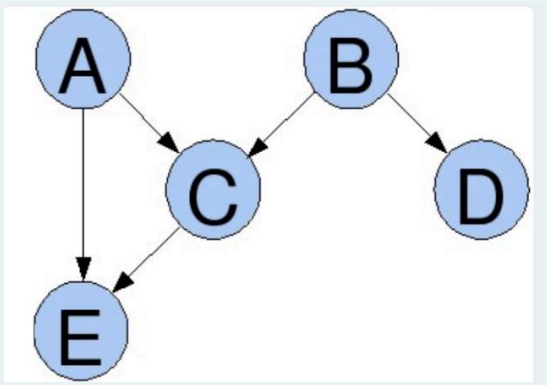
A, D

D, C

8

Which pairs of variables are independent in the graphical model here, given that none of them are observed?

(3 Points)



A, E

A, B

D, E

A, C

None - no pairs of independent variables

9

Read carefully and answer: (5 Points)

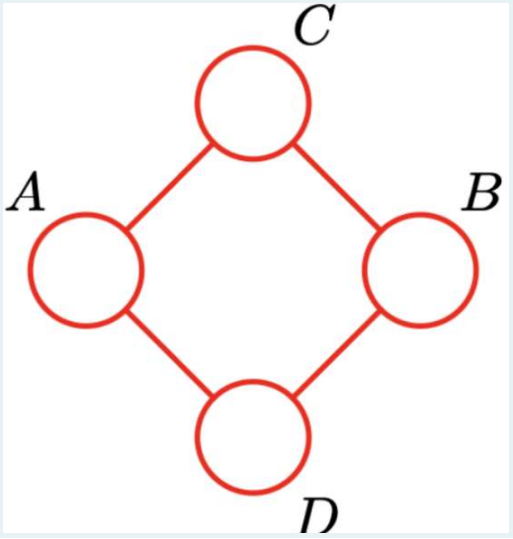
Consider the following set of factors: $\Phi = \{\Phi_1(A, B), \Phi_2(B, C, D), \Phi_3(D), \Phi_4(C, E, F)\}$. Now, consider a Markov Network G such that P_Φ factorizes over G. Which of the following is an independence statement that holds in the network? You may select 1 or more options.

Please select 2 options.

- [x] A is independent of E given B
- [x] C is independent of E given B
- [ ] B is independent of E given C
- [ ] C is independent of D given A

10

The conditional independence properties exhibited by the given graph are (Choose all correct options): (2 Points)



- [ ] A and B are unconditionally independent
- [ ] A and B are not unconditionally independent

- [x] C and D are independent when A is observed but B is not observed
- [x] C and D are independent when A and B are observed