Structured CPDs

4/4 得分（100%)

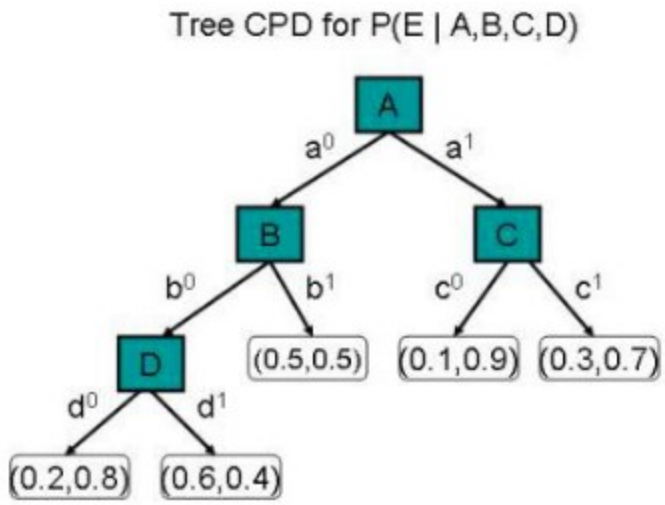
测验通过！

返回第 2 周课程

1 / 1 分

1.

Causal Influence. Consider the CPD below. What is the probability that $E = e_0$ in the following graph, given an observation $A = a_0, B = b_1, C = c_1, D = d_1$? Note that, for the pairs of probabilities that make up the leaves, the probability on the left is the probability of e_0 , and the probability on the right is the probability of e_1 .



0.5

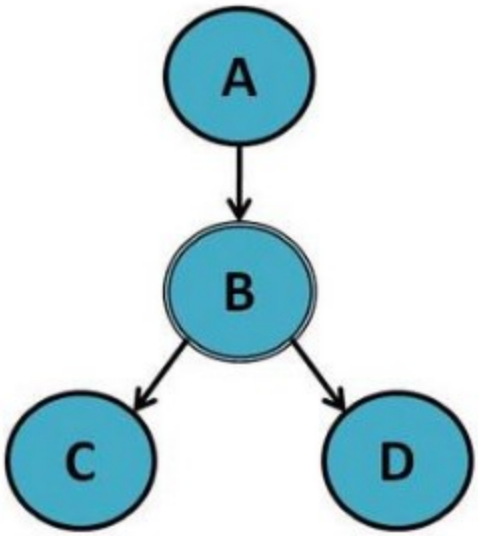
正确回答

This is the probability that is reached when following the tree down the appropriate branches.

✔ 1 / 1 分

2.

Independencies with Deterministic Functions. In the following Bayesian network, the node B is a deterministic function of its parent A. Which of the following is an independence statement that holds in the network? You may select 1 or more options.



☐ $(B \perp D \mid C)$

正确回答

B is a deterministic function of A, not C, and D is a child of B, so observing C does not make B and D independent.

☐ $(A \perp B \mid C, D)$

正确回答

Since B is a deterministic function of A, A and B are dependent, regardless of whether C and D are observed.

☑ $(A \perp D \mid B)$

正确回答
Given B, there is no active trail between A and D therefore, they are conditionally independent.

☑ $(C \perp D \mid B)$

正确回答
Since B is given and is the only parent of C and of D, C and D are independent.

✔ 1 / 1 分

3.
Independencies in Bayesian Networks. For the network in the previous question, let B no longer be a deterministic function of its parent A. Which of the following is an independence statement that holds in the modified Bayesian network? You may select 1 or more options.

☐ $(A \perp B \mid C, D)$

正确回答
Since B is child of A, the variables cannot be independent, even if other variables are observed.

☐ $(C \perp D \mid A)$

正确回答
Since A is not on the active trail from C to D, observing A does not make C and D independent.

☐

$(A \perp D \mid C)$

正确回答

Since C is not on the active trail from A to D, observing C does not make A and D independent.

$(A \perp D \mid B)$

正确回答

The only active trail from A to D passes through B, and there are no V-structures between A and D, so observing B makes A and D independent.

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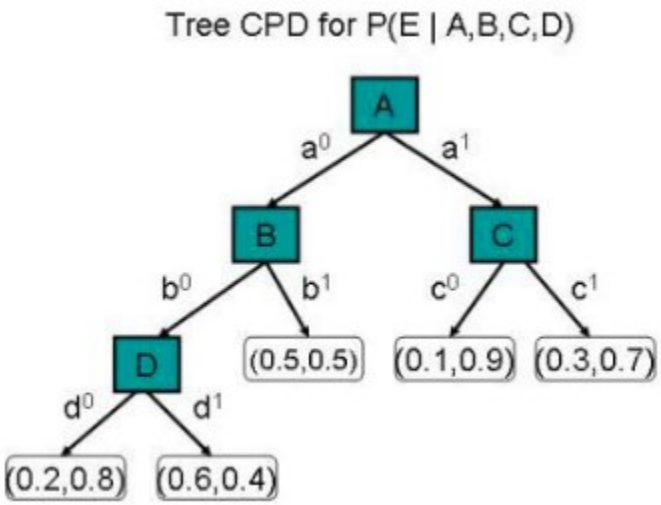
1 / 1 分

4.

Context-Specific Independencies in Bayesian Networks.

Which of the following are context-specific independences that **do** exist in the tree CPD below? (Note: Only consider independencies in this CPD, ignoring other possible paths in the network that are not shown here. You may select 1 or more options.)



$(E \perp_c C \mid a^0, b^0)$

正确回答

A variable X is independent of E given conditioning assignments $\bar{z}$ if all paths consistent with $\bar{z}$ traversed in the tree CPD reach a leaf without querying X . This is true for this option.

☐ $(E \perp_c D \mid a^0)$

正确回答
A variable X is independent of E given conditioning assignments $\bar{z}$ if all paths consistent with $\bar{z}$ traversed in the tree CPD reach a leaf without querying X . This is not true for this option because, depending on the value of B , D might be queried.

☐ $(E \perp_c C \mid b^0, d^0)$

正确回答
A variable X is independent of E given conditioning assignments $\bar{z}$ if all paths consistent with $\bar{z}$ traversed in the tree CPD reach a leaf without querying X . This is not true for this option because C is on a separate branch from B and D , and the initial branch is not even known since it depends on A .

☑ $(E \perp_c D, B \mid a^1)$

正确回答
A variable X is independent of E given conditioning assignments $\bar{z}$ if all paths consistent with $\bar{z}$ traversed in the tree CPD reach a leaf without querying X . This is true for this option.