Test3-ProbabilisticReasoning

- Due Mar 21 at 4:40pm
- Points 30
- Questions 15
- Available Mar 21 at 4pm - Mar 21 at 6pm 2 hours
- Time Limit 35 Minutes

Instructions

Closed book test. Use one page for scratch work and submit it with your name on it.

Online test: scratch page will not be be used for the grading purpose.

Choose the best answer. You may need a calculator.

Usual upper/lower case semantics apply, e.g., for the proposition Cavity, cavity means Cavity=True, and ~cavity means Cavity=False.

~ tilde or - dash may be used for negation.

This quiz was locked Mar 21 at 6pm.

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	30 minutes	22 out of 30

ⓘ Correct answers are hidden.

Score for this quiz: 22 out of 30
Submitted Mar 21 at 4:29pm
This attempt took 30 minutes.

Incorrect Question 1
0 / 2 pts

The model for a Probabilistic Knowledge Base is a ----------

- (●) Truth table
- ( ) None of the above
- ( ) Joint probability distribution table
- ( ) Conditional probability table

Question 2
2 / 2 pts

A given knowledge base has 5 random variables. Four of these variables are Propositions and one is categorical with 3 domain values. How many *INDPENDENT* probability numbers are needed in the joint probability distribution table? (^ indicates power, e.g., 9^2=81, and ^ has the highest precedence in arithmetic.)

- (selected) 2^4*3 -1
- 2^4*3
- 4^2*3 -1
- 4^2*3

Question 3
2 / 2 pts

P(A ^ B) = P(A|B)P(B), even when A and B are independent of each other. (^ is 'and')

- (selected) True
- False

IncorrectQuestion 4
0 / 2 pts

On a Bayesian net over four propositional random variables {A, B, C, D} looking like an inverted Y-graph,
A->B, B->C, B->D
how many INDEPENDENT probability entries are required over all probability tables?

- 2+1+4+2
- (selected) 2+2+4+2
- 1+2+2+2
- 1+1+4+1

Question 5
2 / 2 pts

A Bayesian Network over three propositional random variables has a V-type structure: B->A and C->A.

What is the probability P(~a ^ ~b ^ ~c) proportional to? (^ is and)

Remeber upper/lower case semantics, e.g., b means B=T and ~b means B=F.

- P(~a | ~b, ~c) P(~b | ~c) P(~c | ~b)
- P(a | ~b, ~c) P(a |~b) P(a |~c)
- P(~a | ~b, ~c) P(~b) P(~c)
- P(~a|~b) P(a |~c)

Question 6
2 / 2 pts

Here is a V-type Bayesian Network over three propositional random variables, B->A and E->A with the probability tables, P(b)=0.001, P(e)=0.02, and the conditional probability table,
P(a|B,E) = {(T,T,0.95), (T,F,0.94), (F,T,0.29), (F,F,0.001)} in 4 rows respectively.
Usual upper/lower case semantics apply, e.g., b means B=T and ~b means B=F.
What is the probability for P(a|~e), presuming the normalization constant is *alpha*?

- alpha*(0.95+0.29)
- alpha*(0.29 + 0.001)
- alpha*(0.94+0.29)
- alpha*(0.94+0.001)

Question 7
2 / 2 pts

Bayesian Network from the above question over 3 propositions: B->A and E->A with the probability tables, P(b)=0.001, P(e)=0.02, and the conditional probability table,
P(a|B,E) = {(T,T,0.95), (T,F,0.94), (F,T,0.29), (F,F,0.001)} in 4 rows respectively.
Usual upper/lower case semantics apply, e.g., b means B=T and ~b means B=F.

How many values are there for P(a | E)?

- 4
- 3
- 2
- Unknown

Question 8
2 / 2 pts

Bayes theorem: P(A | B)P(A) = P(B | A)P(B)

- (•) Wrong
- ( ) Correct
- ( ) Depends
- ( ) None of the above

Question 9
2 / 2 pts

Two random variables A and B have three values in each of their domains.

A FULL joint distribution P(A | B) indicates how many total values? (NOT only independent values)

(Remember upper/lower case semantics for propositions A and B)

- (•) 3*3
- ( ) 2^3
- ( ) 3+3
- ( ) 3*2

Question 10
2 / 2 pts

Two random variables A and B have three values in each of their domains.

A conditional probability distribution P(A | B) will need how many INDEPENDENT values?

(Remember upper/lower case semantics for propositions A and B)

- ( ) 5
- ( ) 3
- (•) 6
- ( ) 9

Question 11
2 / 2 pts

P(toothache | cavity) = 1- P(~toothache | cavity)

- 1- P(~toothache | cavity)
- 1- (P(~toothache ^ cavity)/P(cavity))
- All of the above
- P(toothache ^ cavity)/P(cavity)

IncorrectQuestion 12
0 / 2 pts

What is the value of P(~toothache V ~cavity) computed from the following table?

	toothache		~toothache	
	catch	~catch	catch	~catch
cavity	.108	.012	.072	.008
~cavity	.016	.064	.144	.576

- .016 +.064 +.144 +.576 +.144 +.576 +.072 +.008
- .016 +.064 +.144 +.576 +.072 +.008
- .016 +.064 +.144 +.576
- .144 +.576

Question 13
2 / 2 pts

What is the value of P(~toothache | cavity) computed from the following table?

	toothache		~toothache	
	catch	~catch	catch	~catch

cavity	.108	.012	.072	.008
~cavity	.016	.064	.144	.576

- 0.2/0.8
- 0.72/0.8
- 0.08/0.2
- 0.8/0.72

Question 14
2 / 2 pts

What is the value of P(~toothache) computed from the following table?

	toothache		~toothache	
	catch	~catch	catch	~catch
cavity	.108	.012	.072	.008
~cavity	.016	.064	.144	

- .072+.008+.144
- .108+.012+.016+.064
- None of the above
- .072+.008+.144+.576

IncorrectQuestion 15
0 / 2 pts

Consider the Bayesian network in the burglary domain example (B->A, E->A, A->J, A->M). Prior probabilities: P(b)=.001, P(e)=.002. Conditional probability P(a|B,E) is below. P(j|A) = (.90,.05), and P(m|A)=(.70, .01). What is P(j,m,~a,~b,e)?

T	T	.95
T	F	.94
F	T	.29

F	F	.001

- .05*.01*.29*.999*.002
- .05*.01*(1-.29)*.999*.002
- None of the above
- .05*.01*(1-.29)*.001*.002

Quiz Score: 22 out of 30