Decision Making PA Quiz

Quiz, 9 questions

9/9 points (100%)

Congratulations! You passed!

Next Item

1 / 1 point

1.

This quiz is a companion quiz to the Programming Assignment on Decision Making. Please refer to the writeup for the programming assignment for instructions on how to complete this quiz.

We have provided an instantiated influence diagram FullI (complete with a decision rule for D) in the file FullI.mat. What is the expected utility for this influence diagram? Please round to the nearest tenth (i.e., 1 decimal place), do not include commas, and do not write the number in scientific notation.

-685.9531

Correct Response

This is the output of SimpleCalcExpectedUtility(FullI).

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1 / 1 point

2.

Run ObserveEvidence.m on FullI to account for the following: We have been informed that variable 3 in the model, which models an overall genetic risk for ARVD, has value 2 (indicating the presence of genetic risk factors). Then run SimpleCalcExpectedUtility on the modified influence diagram. What happened to the expected utility? (Hint -- ObserveEvidence does not re-normalize the factors so that they are again valid CPDs unless the normalize flag is set to 1. -- If you do not use the normalize flag, you can use NormalizeCPDFactors.m to do the normalization.)

- The expected utility might or might not change because there is some randomness in the process for determining the expected utility.
- It substantially decreased.

Correct

It decreased from -685.9 to -729.2

- It substantially increased.

It did not change.

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1 / 1 point

3.

Why can we explicitly enumerate all the possible decision rules while we often cannot enumerate over all possible CPDs?

- In an influence diagram, each decision node cannot have more than 1 parent, while in a general Bayes net, a node can have many parents.
- All choices have a probability of either 0 or 1, where in a general CPD, choices could take on any value in [0, 1].

Correct

Because each choice is restricted to a finite set of probabilities, there is a finite number of possible decision rules, so we can enumerate over all of them.

- If there is one choice in a decision rule, at least one choice must have a 0 probability, where in a general CPD, no entries are restricted to having 0 probabilities.
- We can actually always enumerate over all possible CPDs.

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1 / 1 point

4.

Let a decision node D take on d possible values. Let it have m parents that can each take on n possible values. How many possible decision rules δ_D are there?

- $d^{(m^n)}$
- dnm
- $d^{(2n^m)}$
- $d(n^m)$
- $d^{(n^m)}$

Correct

Since each of the m parents can take on n values, there are n^m joint assignments over the parents. Since there are d values for the decision node, and all combinations of decisions over all joint assignments of parents to values are possible decision rules, there are $d^{(n^m)}$ possible decision rules.

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- $2d(n^m)$
- $d(m^n)$

1 / 1 point

5.
Consider an influence diagram with 1 decision node D that can take on d values. Let D have m parents that can each take on n values. Assume that running sum-product inference takes $O(S)$ time. What is the run-time complexity of running OptimizeMEU on this influence diagram?

- $O(S + dn^m)$

Correct
Sum-product inference can be run only once, and it requires $O(S)$ time. The results of sum-product inference can be used to construct a table that is the number of instantiations to the parents, which is n^m, by the number of decision values, which is d. To choose the optimal decision, it is sufficient to scan through the table once. Thus, the total run-time is $O(S + dn^m)$.

- $O(d^{(n^m)})$
- $O(S + n^m)$
- $O(S + dnm)$
- $O(Sdn^m)$
- $O(Sn^m)$
- $O(Sdnm)$

1 / 1 point

6.
In which of the following situations does it make sense to use OptimizeWithJointUtility instead of OptimizeLinearExpectations?

- When every random variable in the network is a parent of at least one other utility factor.
- When the bottleneck in inference is in enumerating the large number of possible assignments to the parents of the utility variables, and each utility variable has a disjoint set of parents.
- When the scopes of the utility factors are large compared to the scopes of the other (random variable) factors.

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When there are large factors in the random-variables part of the influence diagram, making inference over the network slow, and there are only a few utility factors, each involving a small number of variables.

Correct

If there are only a few utility factors, each involving a small number of variables, combining them into a joint factor won't result in too big a factor. Since the size of the utility factor is not in running inference, and since inference is expensive and we don't want to run it once for each utility factor, it makes sense to create a joint utility factor.

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1 / 1 point

7.

In the field below, enter the dollar value of the test T1, rounded to the nearest cent (e.g., "1.23" means that you would pay $1.23 for the test; any more than that, and your net utility will be lower than if you didn't perform any test). Do not precede with the amounts with dollar signs.

155.9711

Correct Response

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1 / 1 point

8.

In the field below, enter the dollar value of the test T2, rounded to the nearest cent (e.g., "1.23" means that you would pay $1.23 for the test; any more than that, and your net utility will be lower than if you didn't perform any test). Do not precede with the amounts with dollar signs.

2.8180

Correct Response

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1 / 1 point

9.

In the field below, enter the dollar value of the test T3, rounded to the nearest cent (e.g., "1.23" means that you would pay $1.23 for the test; any more than that, and your net utility will be lower than if you didn't perform any test). Do not precede with the amounts with dollar signs.

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Correct Response