
Practice Exam 2 questions: Fall 2013

Knowledge Representation

- Why is Knowledge Representation important?
- How does it affect computation?
- What are 3 types of Knowledge Representation systems/languages discussed in class
- What are their advantages/disadvantages?

Planning

The “jugs problem” : You have a well, and two water jugs: jug A is size 3 gallons and jug B is 5 gallons. The goal is to get 4 gallons in one of the jugs. In doing so, you are allowed to:

Fill up either jug completely

Empty either jug completely

Pour water from one jug to the other, until the poured jug is empty, or the other jug is full.

Specify

- The initial state
- The operators. For each operator, give the preconditions and effects.

What is the correct plan to solve this problem using POP?

Reasoning about Uncertainty

- (T/F) If $P(a|b,c) = P(b|a,c)$ then $P(a|c) = P(b|c)$
- (T/F) If $P(a|b,c) = P(a)$ then $P(b|c) = P(b)$
- (T/F) If $P(a|b) = P(a)$ then $P(a|b,c) = P(a|c)$
- Your doctor performs a series of medical tests. You test positive for a serious, but very rare disease. The test is 99% accurate, meaning the probability that it is positive when you do have the disease is 0.99, and the probability that it is negative if you don't is also 0.99. The disease strikes 1 in 10,000.

What is the probability that you have the disease? Give both the formula and the value.

e. Given the full joint probability table for the dentist problem, draw the Bayesian network and its corresponding conditional probability tables. Calculate the $P(\text{Cavity} / \text{toothache})$ using the conditional probability tables.

	<i>toothache</i>		\neg <i>toothache</i>	
	<i>catch</i>	\neg <i>catch</i>	<i>catch</i>	\neg <i>catch</i>
<i>cavity</i>	.108	.012	.072	.008
\neg <i>cavity</i>	.016	.064	.144	.576

Learning

a. Draw the neural network to solve the XOR function for two inputs. Specify what type of units you are using.

b. Why is Machine Learning need?

c. For what types of problems would you apply each of the following learning techniques?

- Decision Tree
- Neural Net
- Bayesian Learning
- Example-based Learning
- Reinforcement Learning
- Support Vector Machine

Current/Future directions of AI Research

For the questions below choose any 2 guest speakers from weeks12&13:

- a. Describe their work and how it relates to the material discussed in class
- b. Describe the contributions of the work of each presenter
- c. Describe the limitations/pitfalls and future directions of each work
- d. Compare and contrast the two research