

School of Computing Science

Simon Fraser University

CMPT 310 - Introduction to Artificial Intelligence

Term: Fall 98-3
Section: 310-3 (D01)
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Assignment #5: Belief Networks

Due Date: Friday 1998 December 4 (by 3pm)

Background

1. Read E. Charniak, *"Belief Networks without Tears"* (distributed in class).
2. Learn to use the Netica Belief Network system on the WindowsNT machines in the CSIL lab by reading the Netica documentation online. New login IDs are being issued for all 310 student to use these machines.

Exercises

1. Load the example belief network called Car_Diagnosis_2 and experiment with the causal relationships between nodes.
 - Suppose the car won't start but the engine cranks normally. What are the most likely direct causes for the problem?
 - Suppose you remember that you may have forget (80% sure) to fill the gas tank. How does this affect the likelihoods of all direct causes for the malfunction?
 - So you fill the gas tank from a Gerry Can (portable gas can). Now what are the probabilities?
 - Finally, you examine the air filter and find it rather dirty. What is the most likely cause of the engine not starting?
2. Do programming exercise 15.4 on p.469 on AIMA modified as follows.
 - Assume that your evidence variables are the following:
 - Age (1-10, 11-20, 21-30, 31-40, 41-60, 61-80, 81-100)
 - MaritalStatus (single, married, divorced)
 - Income (\$0-10K, \$11K-20K, \$21K-40K, \$41K-100K)
 - Employment (estateAgent, burgerFlipper, student, poet)
 - Hobbies (netHacking, hangGliding, shopping, sportsCars)
 - Sex (male, female)
 - Political Party (NDP, Liberal, PC, Reform, Anarchist)

- You will have to decide what the intermediate nodes are in your belief network. You will also have to make policy decisions about how to measure credit worthiness given seemingly irrelevant information about each applicant. Is it reasonable / ethical to use any such information? In your answer, please provide in English a justification for your actual conditional probability tables. Remember you are working for some nameless bank, so you must evaluate the risk of each applicant as best you can given the information.
- Answer whether the following specific individuals should be issued a credit card. Use these test cases for your belief network.

Table 1:

Name	Age	Marital Status	Income	Employment	Hobbies	Sex	Political Party
Hilda Hobozophen	22	single	16K	student	hangGliding	female	Anarchist
Leo Spritzer	75	married	27K	poet	sportsCars	male	NDP
Gomer Foo	13	single	50K	student	netHacking	male	PC
Lucille Doodle	33	divorced	75K	estateAgent	shopping	female	Reform
L. R. Floyd	17	single	19K	burgerFlipper	sportsCars	male	NDP