CPSC 327 Artificial Intelligence Spring 2015: Mid-Term Study Guide

February 24, 2015

1 Name 5 Attributes of Intelligence

Use the reading, class notes, your paper, and my comments to prepare 5 attributes of intelligence that you can write for this part of the test.

2 Grammars

Given the following grammar:

$$
\begin{aligned}
A &\rightarrow B \ \text{'\&'} \ C \\
B &\rightarrow C \ \text{'\%'} \ C \\
C &\rightarrow \ \text{'[a-z]'}
\end{aligned}
$$

which of the following are valid?

1. a % b & c
2. b % c % d
3. x & y % z
4. x % y & z

Given the following grammar:

$U \rightarrow$ V ' ' U | V
$V \rightarrow$ '[a-z]+' | '(' U ')'

which of the following are valid?

1. I shot an elephant in my pajamas
2. all roads lead to rome
3. amen
4. what is the flying speed of an unburdened sparrow (european or african)

3 Proofs in The Wumpus World

Keep these logic rules in your back pocket:

- Or Commutativity: $A \vee B \equiv B \vee A$.
- And Commutativity: $A \wedge B \equiv B \wedge A$.
- Or Associativity: $A \vee (B \vee C) \equiv (A \vee B) \vee C$.
- And Associativity: $A \wedge (B \wedge C) \equiv (A \wedge B) \wedge C$.
- Double Negation: $\neg\neg A \equiv A$.
- Contraposition: $A \rightarrow B \equiv \neg B \rightarrow \neg A$.
- Implication Elimination: $A \rightarrow B \equiv \neg A \vee B$.
- Biconditional Elimination: $A \leftrightarrow B \equiv (A \rightarrow B) \wedge (B \rightarrow A)$.
- DeMorgan's Law 1: $\neg(A \wedge B) \equiv \neg A \vee \neg B$.
- DeMorgan's Law 2: $\neg(A \vee B) \equiv \neg A \wedge \neg B$.
- Distribute Or: $A \vee (B \wedge C) \equiv (A \vee B) \wedge (A \vee C)$.
- Distribute And: $A \wedge (B \vee C) \equiv (A \wedge B) \vee (A \wedge C)$.

and these inference rules:

- Modus Ponens:
$$\frac{A \rightarrow B, A}{B}$$
.
- And Elimination:
$$\frac{A \wedge B}{A}$$

1. Given the rules:

R1: $\neg P_{1,1}$.

R2: $B_{1,1} \leftrightarrow (P_{1,2} \vee P_{2,1})$.

R3: $B_{2,1} \leftrightarrow (P_{1,1} \vee P_{2,2} \vee P_{3,1})$.

we then visit [1,1] and [2,1] and learn the following facts:

R4: $\neg B_{1,1}$.

R5: $B_{2,1}$.

A. Prove that there is no pit at location [1,2].

Now move to location [1,2] and learn the following fact:

R5: $\neg B_{1,2}$.

B. Prove that there is a pit in location [3,1]

4 prolog Programs

4.1 What, if anything, is wrong with the following prolog clause?

sibling(A,B):- parent(X,A), parent(X,B).

What will result if it is run against family.pl?

4.2 Write a set of prolog clauses to define a fibonacci sequence