CompSci 367/761

Assignment 1: Simple Prolog

Worth: 6% of total grade
Due Date: Monday 10 August 01:00am
What to submit: you are to submit the following 6 prolog files lawpa.pl, lawneph.pl, solveRiddle1.pl, solveRiddle2.pl, and solveRiddle3.pl
Where to submit: You need to submit these files to Computer Science's Automatic Drop Box (adb.auckland.ac.nz)

Introduction:
There are two parts to this assignment. The first part is to use Prolog to "define" some terms. The second part uses Prolog to solve the riddles. Translating the English directly into Prolog may be difficult. You may find it easier to first translate the English into First Order Logic and then to translate that into Prolog.

For these parts you are **NOT** being asked to solve them**!!!!** Instead, you are being asked to write Prolog rules that express the relationships implicit in the riddles and in the puzzle, such that when appropriate queries are asked of the Prolog interpreter, the correct answers will be computed. Note that for Parts I and II, the markers will supply their own databases to test that the rules have captured the correct relationships. Therefore **do not** submit your own sets of facts that you used to test your Prolog.

Part I: "Defining" terms.

There are two English sentences that describe two fictitious family relationships. These sentences will need to be translated into Prolog rules. These rules will only use the following primitive family predicates: *parentOf(Parent, Child), spouseOf(Spouse, Person), male(Person),* and *female(Person)*, the names of the arguments are chosen to suggest what role the argument plays in the relationship. When the markers mark your assignment they will use their own Prolog databases that are populated with facts about some fictitious extended family.

Sentence 1: [1 mark]
Write a prolog rule for *lawpa(Lawpa, Person)* that captures the implication below of how someone can be a *Lawpa* of a *Person*.

> "If someone is my spouse's father then he is my *lawpa*. "

Sentence 2: [1 mark]
Write a prolog rule for *lawneph(Lawneph, Person)* that captures the implication below of how someone can be a *Lawneph* of a *Person*.

> "If someone is my spouse's nephew then he is my *lawneph*."

Part II: Riddles

There are three age-old riddles below that you will need to translate into Prolog rules, one rule per riddle.

Your rules must use the same primitive family predicates as specified in Part I. Additionally, you can also expect the following two rules to be present in this Part's database:
"*olderThan(X,Y) :- parentOf(X,Y).*"
and
"*olderThan(X,Y) :- parent(X,Z), olderThan(Z,Y).*".
In other words, these rules state that parents are always older than their children and that this is transitive (e.g., grandparents are always older than their children's children, etc.). These two rules will be needed for riddle 3.

Riddle 1: [1 mark]
You have the following riddle: "*A man was looking at a portrait and was asked 'Whose picture are you looking at?' He replied: 'Brothers and sisters have I none, but this man's father is my father's son.' (*'This man's father'* means the father of the man in the picture.) Whose picture was the man looking at?"*

Write a rule for *solveRiddle1(ManLooking, ManInPortrait)*, such that the body of the rule captures the relationship between the *ManInPortrait* and the *ManLooking* that is described in the riddle above. Note, the rule should work correctly regardless of whether either, both, or none of the arguments are instantiated.

Riddle 2: [1 mark]
You have the following riddle: "*A man was looking at a portrait and was asked 'Whose picture are you looking at?' He replied: 'Brothers and sisters have I none, but this man's son is my son's father.' (*'This man's son'* means the son of the man in the picture.) Whose picture was the man looking at?"*

Write a rule for *solveRiddle2(ManLooking, ManInPortrait)*, such that the body of the rule captures the relationship between the *ManInPortrait* and the *ManLooking* that is described in the riddle above. Note, the rule should work correctly regardless of whether either, both, or none of the arguments are instantiated.

Riddle 3: [2 marks]
You have the following riddle: "*My father is older than my grandfather, who is this younger grandfather?"*

Write a rule for *solveRiddle3(Person, PersonsGrandfather)*, such that the body of the rule captures the relationship between the *person,* his *father*, and his *grandfather* that is described in the riddle above. Note, the rule should work correctly regardless of whether either, both, or none of the arguments are instantiated.

An aside:

If you have any questions, please consult the CS367 class forum first to see if your question has already been answered. If it has not been addressed in any thread then create a new question and decide whether your question belongs in an existing thread or deserves a thread of its own. I know it may seem hard to believe (or not :^)) but your fellow students probably understand your question better than I. After 40 years of studying AI, I sometimes find it difficult to understand what it is that you don't understand. However, it is probably pretty clear to your fellows students what it is that you are asking, because they had the same question a few hours or days earlier. They will know exactly what it is that you need to know to solve your problem. I will try to keep track of which questions have not yet been satisfactorily answered and to answer those that no one else has tried to answer. However, if you have posted a question to the forum and it has been a couple of days and no one has answered then please write to me about your question and I will post my answer back to you and to the forum.

I hope you all enjoy this assignment and find it educational!

Mike