UCS1524 – Logic Programming

Developing a Simple shell

Session Meta Data

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Session Objectives

- Understanding development of simple shell in ES.

Session Outcomes

- At the end of this session, participants will be able to
  - Develop an expert system with simple shell

Agenda

- Development of simple shell
  - Facts
  - Rules
  - Queries
- Outline of reasoning process
- Answering
  - Why questions
  - How questions

Development of an Expert System

- Steps
  - Consult actual experts for that domain and learn a great deal about it yourself.
  - Extracting some understanding of the domain from experts and literature and moulding this understanding in to a chosen knowledge-representation formalism is called the art of knowledge engineering.

Expert System in Prolog

Knowledge base to identify animals

- If it has a *fur* and says *woof*, then the animal is a **dog**.
- If it has a *fur* and says *meow*, then the animal is a **cat**.
- If it has *feathers* and says *quack*, then the animal is a **duck**.

Expert System in Prolog

Knowledge base to identify animals

- If it has a *fur* and says *woof*, then the animal is a **dog**.
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- If it has *feathers* and says *quack*, then the animal is a **duck**.

- animal(dog) :- is_true('has fur'), is_true('says woof').
- animal(cat) :- is_true('has fur'), is_true('says meow').
- animal(duck) :- is_true('has feathers'), is_true('says quack').
- is_true(Q) :- format("~w?\n", [Q]), read(yes).
- Goal : ?- animal(A).

Outline of a reasoning process

To find an answer *Answ* to a question *Q* use one of the following:

- if *Q* is found as a fact in the knowledge base then *Answ* is '*Q* is true'
- if there is a rule in the knowledge base of the form

  'if *Condition* then *Q*'

  then explore *Condition* in order to find answer *Answ*.
- if *Q* is an 'askable' question then ask the user about *Q*.

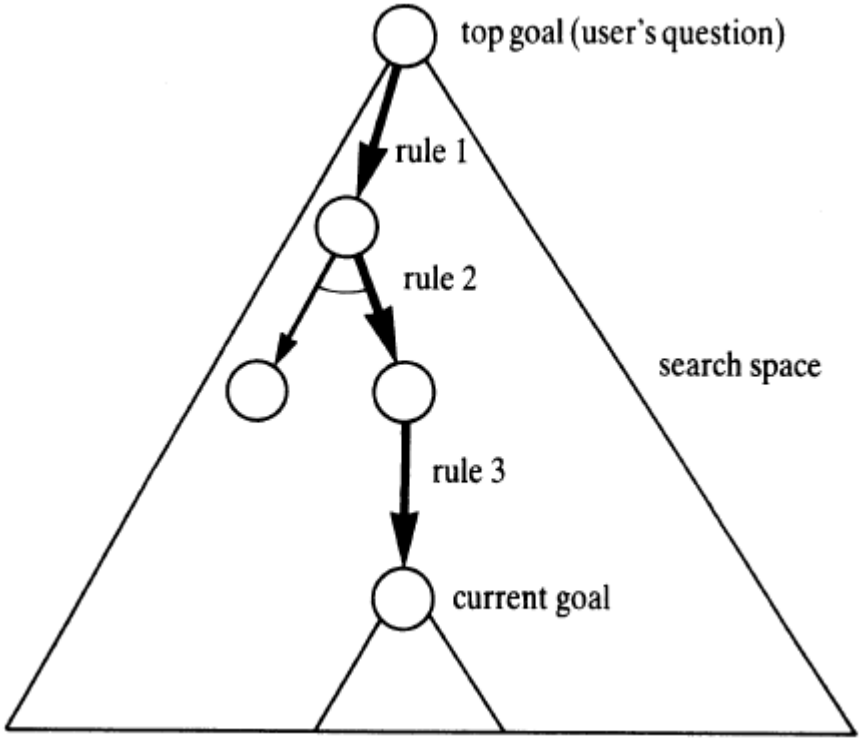
- if *Q* is of the form *Q1 and Q2* then explore *Q1* and now:
  if *Q1* is false then *Answ* is '*Q* is false', else explore *Q2* and appropriately combine answers to both *Q1* and *Q2* into *Answ*.
- if *Q* is of the form *Q1 or Q2* then explore *Q1* and now:
  if *Q1* is true then *Answ* is '*Q* is true', or alternatively explore *Q2* and appropriately combine answers to both *Q1* and *Q2* into *Answ*.

Answering why questions

- A 'why' question occurs when the system asks the user for some information and the user wants to know why this information is needed.
- Suppose that the system has asked:
  - Is a true?
- The user may reply:
  - why?
- Explanation
  - I can use a to investigate b by rule Ra, and
  - I can use b to investigate c by rule Rb, and
  - I can use c to investigate d by rule Rc, and
  - I can use y to investigate z by rule Ry, and
  - z was your original question.

Answering why questions

- Trace



Answering how questions

- A proper way of answering how question is to display the evidence: i.e rules and subgoals from which the conclusion was reached

peter isa carnivore
was derived by rule3 from
peter isa mammal
was derived by rule1 from
peter has hair
was told
and
peter eats meat
was told

Summary

- Development of simple shell
  - Facts
  - Rules
  - Queries
- Outline of reasoning process
- Answering
  - Why questions
  - How questions

Check your understanding

- There are 6 movies stored in a system. An automatic movie playing system plays a movie to the user based on his/her mood and age.
- System should ask the user for the age and his/her mood, movie should be played accordingly.
- Define ‘movie’ clause by considering the age and the mood.
- Use write() and read() functions to ask the question and get the response from the user.
- Define ‘play’ clause which interact with user and play the required movie for the user.