Experiment No. 6

Title: Goal based agent for solving a murder mystery

Batch: B4 Roll No.: 16010420133 Experiment No.: 6

Aim: Write a program for implementation of solution of based a Murder Mystery using knowledge agent architecture.

Resources needed: PROLOG Suite

Theory

Knowledge is vast, uncertain and continuously changing. These properties of knowledge make it difficult to arrive at a result. A murder mystery is a kind of situation which depicts the uncertain nature of knowledge and also emphasizes the need of choosing right clauses from entire knowledgebase to make a decision. The goal based agent architecture and some knowledge engineering can help in solution of such problems.

The logical agents are complex but they can reason and learn from the actions and new precepts. They are less like acting and think like humans but more like acting and thinking rational agents. Knowledge and reasoning play a crucial role in dealing with partially observable environments. A knowledge based agent can combine the general knowledge with current percept to infer the hidden aspects of the current state prior to selecting actions. The knowledge engineering process can be broadly described as:

1. Identify the task
2. Assemble the relevant knowledge
3. Decide on vocabulary of predicates, functions and constants
4. Encode general knowledge about the domain
5. Encode description of specific problem instance
6. Pose queries to the inference procedure and get answers
7. Debug the knowledgebase

Procedure:

Define the contents of three sections of prolog program as follows-

1. Define Domain section :- Define various variables and symbols needed for problem. (Similar to definition part of conventional programming)
2. Define Predicates:- Different relation between symbols and variables are to be declared . (similar to defining function prototype in conventional programming)
3. Define Clauses:- Various facts and rules supporting the predicates declared are to be defined.

Predicates used in Program:

feud(person,person)

affair(person,person)

killedwith(object,person)

negativity(vice,person)

spouse(person,person) killed(person)

objectsfound(object)
workswith(occupation,person)

occupationrelated(object,occupation)

killer(person,person)

objectsuspect(person,object)

revenge(person,person)

suspect(person,person)

.

Results: (Softcopy submission of Summary Document)

```
man(george).
man(john).
man(robert).
woman(barbara).
woman(christine).
woman(yolanda).

room(bathroom).
room(diningroom).
room(kitchen).
room(livingroom).
room(pantry).
room(study).

weapon(bag).
weapon(firearm).
weapon(gas).
weapon(knife).
weapon(poison).
weapon(rope).
```

```
 suspect(X) :- man(X).
suspect(X) :- woman(X).

writevals(Bathroom, Diningroom, Kitchen, Livingroom, Pantry, Study, Bag, Firearm, Gas, Knife, Poison,
Rope) :-

nl, write(" Locations "), nl,
write("Bathroom: "), write(Bathroom), nl,
write("Dining Room: "), write(Diningroom), nl,
write("Kitchen: "), write(Kitchen), nl,
write("Living Room: "), write(Livingroom), nl,
write("Pantry: "), write(Pantry), nl,
write("Study: "), write(Study), nl,

nl, write(" Weapons "), nl,
write("Bag: "), write(Bag), nl,
write("Firearm: "), write(Firearm), nl,
write("Gas: "), write(Gas), nl,
write("Knife: "), write(Knife), nl,
write("Poison: "), write(Poison), nl,
write("Rope: "), write(Rope), nl.

init_suspects(Suspect1, Suspect2, Suspect3, Suspect4, Suspect5, Suspect6) :-
suspect(Suspect1), suspect(Suspect2), suspect(Suspect3), suspect(Suspect4), suspect(Suspect5),
suspect(Suspect6),
\+ Suspect1 = Suspect2, \+ Suspect1 = Suspect3, \+ Suspect1 = Suspect4, \+ Suspect1 = Suspect5, \+
Suspect1 = Suspect6,
\+ Suspect2 = Suspect3, \+ Suspect2 = Suspect4, \+ Suspect2 = Suspect5, \+ Suspect2 = Suspect6,
\+ Suspect3 = Suspect4, \+ Suspect3 = Suspect5, \+ Suspect3 = Suspect6,
\+ Suspect4 = Suspect5, \+ Suspect4 = Suspect6,
\+ Suspect5 = Suspect6.

murderer(X) :-
init_suspects(Bathroom, Diningroom, Kitchen, Livingroom, Pantry, Study),
init_suspects(Bag, Firearm, Gas, Knife, Poison, Rope),

% Clue 1
% The suspect in the Kitchen is a Man.
% Rope, Knife, Bag, and Firearm were not found in the Kitchen.
man(Kitchen),
\+ Kitchen = Rope, \+ Kitchen = Knife, \+ Kitchen = Bag, \+ Kitchen = Firearm,

% Clue 2
% The suspects in the Bathroom and Study are Women but not Christine
% Barbara and Yolanda were not in Dining Room, Kitchen, Living Room, or Pantry
woman(Study), woman(Bathroom), \+ Bathroom = christine, \+ Study = christine,
\+ Diningroom = barbara, \+ Kitchen = barbara, \+ Livingroom = barbara, \+ Pantry = barbara,
\+ Diningroom = yolanda, \+ Kitchen = yolanda, \+ Livingroom = yolanda, \+ Pantry = yolanda,

% Clue 3
% The Bag was not with Barbara or george
% The suspect with the Bag was not in Bathroom or Dining Room
\+ Bag = barbara, \+ Bag = george, \+ Bathroom = Bag, \+ Diningroom = Bag,

% Clue 4
% The suspect in the Study was a Woman
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% The suspect in the Study had a Rope
woman(Study),
Rope = Study,

% Clue 5
% The suspect in the Living Room was a Man but not Robert
man(Livingroom), \+ Livingroom = robert,

% Clue 6
% The suspect in the Dining Room didn't have the Knife
\+ Diningroom = Knife,

% Clue 7
% Yolanda was not in either the Pantry or the Study
\+ Pantry = yolanda, \+ Study = yolanda,

% Clue 8
% George had the Firearm
Firearm = george,

% Clue 9
% The suspect in the Pantry had the Gas% The suspect in the Pantry was the Murderer
Pantry = Gas, Pantry = X,
write(X), write(" is the MURDERER"), nl,
writevals(Bathroom, Diningroom, Kitchen, Livingroom, Pantry, Study, Bag, Firearm, Gas, Knife,
Poison, Rope).
```
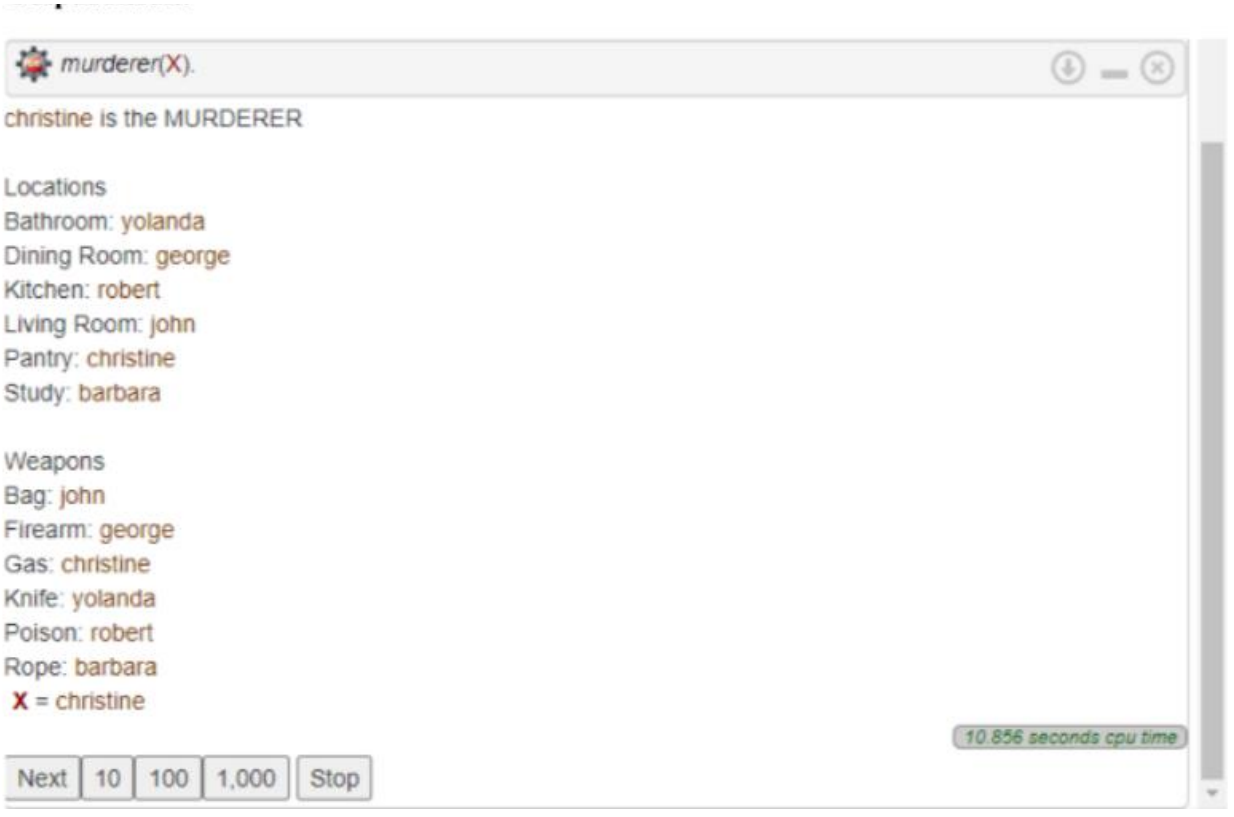

OUTPUT/RESULT



Outcomes: CO3: Ability to formally state the problem and develop the appropriate proof for given a logical deduction problem.

Conclusion: Thus, I implemented and learnt how to solve goal based agent problems in prolog by declaring claus and predicates

Grade: AA / AB / BB / BC / CC / CD /DD

Signature of faculty in-charge with date

References:

- Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Second Edition, Pearson Publication
- Luger, George F. Artificial Intelligence : Structures and strategies for complex problem solving , 2009 ,6th Edition, Pearson Education
- https://www.101computing.net/solving-a-murder-mystery-using-prolog/