Artificial Intelligence

Nehal Jhajharia (U20CS093)
Lab Assignment 2

Questions: Use following predicates as knowledge base to create a family tree.

```
parent(motilal,javaharlal).
parent(motilal,vijyalakshmi).
parent(motilal,krishna).
parent(swarupmati,javaharlal).
parent(swarupmati,vijyalakshmi).
parent(swarupmati,krishna).
male(motilal).
female(swarupmati).
male(javaharlal).
female(kamla).
parent(javaharlal,indira).
parent(kamla,indira).
female(indira).
male(firoz).
parent(indira,sanjay).
parent(firoz,sanjay).
parent(indira,rajiv).
parent(firoz,rajiv).
male(sanjay).
female(menka).
parent(sanjay,varun).
parent(menka,varun).
male(rajiv).
female(sonia).
parent(rajiv,rahul).
parent(rajiv,priyanka).
parent(sonia,rahul).
```

parent(sonia,priyanka).
male(varun).
male(rahul).
female(priyanka).
female(vijyalakshmi).
male(ranjit).
parent(vijyalakshmi,tara).
parent(vijyalakshmi,lekha).
parent(vijyalakshmi,rita).
parent(ranjit,tara).
parent(ranjit,lekha).
parent(ranjit,rita).
female(tara).
female(lekha).
female(rita).
female(krishna).

1. Identify and remove the errors/suggestions in the given knowledge base.

Ans.
parent(motilal,javaharlal).
parent(motilal,vijyalakshmi).
parent(motilal,krishna).
parent(swarupmati,javaharlal).
parent(swarupmati,vijyalakshmi).
parent(swarupmati,krishna).
parent(vijyalakshmi,tara).
parent(vijyalakshmi,lekha).
parent(vijyalakshmi,rita).
parent(ranjit,tara).
parent(ranjit,lekha).
parent(ranjit,rita).
parent(rajiv,rahul).
parent(rajiv,priyanka).
parent(sonia,rahul).

```prolog
parent(sonia,priyanka).
parent(javaharlal,indira).
parent(kamla,indira).
parent(indira,sanjay).
parent(firoz,sanjay).
parent(indira,rajiv).
parent(firoz,rajiv).
parent(sanjay,varun).
parent(menka,varun).
male(motilal).
male(javaharlal).
male(firoz).
male(sanjay).
male(rajiv).
male(varun).
male(rahul).
male(ranjit).
female(menka).
female(indira).
female(kamla).
female(swarupmati).
female(tara).
female(lekha).
female(rita).
female(krishna).
female(vijyalakshmi).
female(priyanka).
female(sonia).
```

2. Generate rules of following relations in considering the given knowledge base:
a. grandparent/2.
b. brother/2.
c. sister/2.
d. uncle/2.
e. aunt/2.
f. mother/2.
g. father/2.
h. wife/2.
i. child/2.
j. son/2.
k. daughter/2.

Ans.
grandparent(X,A):- parent(X,Y),parent(Y,A).
brother(X,Y):- male(Y),parent(A,X),parent(A,Y),X\==Y.
sister(X,Y):-female(Y),parent(A,X),parent(A,Y),X\==Y.
uncle(X,Y):- parent(A,Y),brother(X,A),not(parent(X,A)).
wife(X,Y):-parent(X,A),parent(Y,A),female(X),male(Y).
aunt(X,Y):-uncle(A,Y),wife(X,A).
mother(X,A):-parent(X,A),female(X).
father(X,A):-parent(X,A),male(X).
child(X,A):-parent(A,X).
son(X,Y):-child(X,Y),male(X).
daughter(X,Y):-child(X,Y),female(X).

3. Answer the following queries
a. Find all females in the given tree
Ans. ques1(X):-female(X).

☀ *ques1*(X).

X = menka
X = indira
X = kamla
X = swarupmati
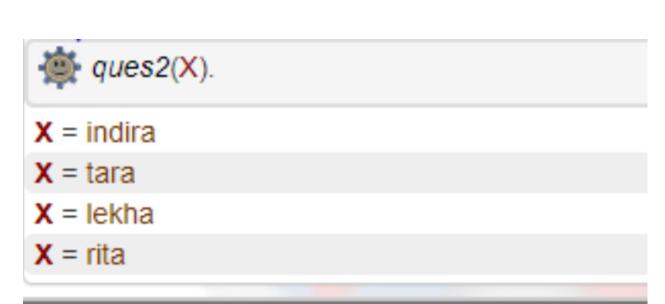**X** = tara
X = lekha
X = rita
X = krishna
X = vijyalakshmi
X = priyanka
X = sonia

?- ques1(X).|

b. How many grandchild do motilal have?
Ans. ques2(X):-grandparent(motilal,X).

ques2(X).

X = indira
X = tara
X = lekha
X = rita

?-
    ques2(X).

d. Who are parents of tara?
Ans. ques4(X,Y):-father(X,tara),mother(Y,tara)

ques4(X,Y).

X = ranjit,
Y = vijyalakshmi

| Next | 10 | 100 | 1, |

?-
    ques4(X,Y).

e. Who are cousins of rajiv?
Ans.ques5(X):-uncle(A,rajiv),child(X,A).

ques5(X).

false

?- ques5(X).