

ARTIFICIAL INTELLIGENCE

Assignment 2

U20CS005

BANSI MARAKANA

Use the following predicates as a 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.

Same clauses were not written together in the source file. After moving all the clauses together, the errors get solved as shown below:

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

male(motilal).
male(javaharlal).
male(firoz).
male(sanjay).
male(rajiv).
male(varun).
male(rahul).
male(ranjit).

female(sonia).
female(swarupmati).
female(kamla).
female(indira).
female(menka).
female(priyanka).
female(vijyalakshmi).
female(tara).
female(lekha).
female(rita).
female(krishna).

2. Generate rules of following relations by considering given knowledge base:

a. grandparent/2.

%X is Grandparent of Z

grandparent(X,Z):-parent(X,Y),parent(Y,Z).

grandparent(X,Z)		
X	Z	
motilal	indira	1
motilal	tara	2
motilal	lekha	3
motilal	rita	4
swarupmati	indira	5
swarupmati	tara	6
swarupmati	lekha	7
swarupmati	rita	8
javaharlal	sanjay	9
javaharlal	rajiv	10
kamla	sanjay	11
kamla	rajiv	12
indira	varun	13
firoz	varun	14
indira	rahul	15
indira	priyanka	16
firoz	rahul	17
firoz	priyanka	18

b. brother/2.

%X is brother of Y

brother1(X,Y):-parent(Z,X),parent(Z,Y),male(X),X\=Y,not(female(Z)).

OR

brother(X,Y):-father(Z,X),father(Z,Y),male(X),X\=Y.

brother1(X,Y)		
X	Y	
javaharlal	vijyalakshmi	1
javaharlal	krishna	2
sanjay	rajiv	3
rajiv	sanjay	4
rahul	priyanka	5

c. sister/2.

%X is sister of Y

sister1(X,Y):-parent(Z,X),parent(Z,Y),female(X),X\=Y,not(female(Z)).

OR

sister(X,Y):-mother(Z,X),mother(Z,Y),female(X),X\=Y.

sister(X,Y)		
X	Y	
vijyalakshmi	javaharlal	1
vijyalakshmi	krishna	2
krishna	javaharlal	3
krishna	vijyalakshmi	4
tara	lekha	5
tara	rita	6
lekha	tara	7
lekha	rita	8
rita	tara	9
rita	lekha	10
priyanka	rahul	11

d. uncle/2.

%X is uncle of Y

uncle(X,Y):-parent(Z,Y),brother(X,Z).

uncle(X,Y)		
X	Y	
javaharlal	tara	1
javaharlal	lekha	2
javaharlal	rita	3
rajiv	varun	4
sanjay	rahul	5
sanjay	priyanka	6

e. aunt/2.

%X is aunt of Y

aunt(X,Y):-parent(Z,Y),sister(X,Z).

aunt(X,Y)		
X	Y	
vijyalakshmi	indira	1
krishna	indira	2
krishna	tara	3
krishna	lekha	4
krishna	rita	5

f. mother/2.

%X is mother of Y

mother(X,Y):-parent(X,Y),female(X).

mother(X,Y)		
X	Y	
swarupmati	javaharlal	1
swarupmati	vijyalakshmi	2
swarupmati	krishna	3
kamla	indira	4
indira	sanjay	5
indira	rajiv	6
vijyalakshmi	tara	7
vijyalakshmi	lekha	8
vijyalakshmi	rita	9
menka	varun	10
sonia	rahul	11
sonia	priyanka	12

g. father/2.

%X is father of Y

father(X,Y):-parent(X,Y),male(X).

father(X,Y)		
X	Y	
motilal	javaharlal	1
motilal	vijyalakshmi	2
motilal	krishna	3
javaharlal	indira	4
firoz	sanjay	5
firoz	rajiv	6
ranjit	tara	7
ranjit	lekha	8
ranjit	rita	9
sanjay	varun	10
rajiv	rahul	11
rajiv	priyanka	12

h. wife/2.

%X is wife of Y

wife(X,Y):-mother(X,Z),father(Y,Z).

wife(X,Y)		
X	Y	
swarupmati	motilal	1
swarupmati	motilal	2
swarupmati	motilal	3
kamla	javaharlal	4
indira	firoz	5
indira	firoz	6
vijyalakshmi	ranjit	7
vijyalakshmi	ranjit	8
vijyalakshmi	ranjit	9
menka	sanjay	10
sonia	rajiv	11
sonia	rajiv	12

i. child/2.

%X is child of Y

child1(X,Y):-parent(Y,X).

OR

child(X,Y):-son(X,Y);daughter(X,Y).

child(X,Y)		
X	Y	
javaharlal	motilal	1
javaharlal	swarupmati	2
sanjay	indira	3
sanjay	firoz	4
rajiv	indira	5
rajiv	firoz	6
varun	sanjay	7
varun	menka	8
rahul	rajiv	9
rahul	sonia	10
vijyalakshmi	motilal	11
krishna	motilal	12
vijyalakshmi	swarupmati	13
krishna	swarupmati	14
indira	javaharlal	15
indira	kamla	16
tara	vijyalakshmi	17
lekha	vijyalakshmi	18
rita	vijyalakshmi	19
tara	ranjit	20
lekha	ranjit	21
rita	ranjit	22
priyanka	rajiv	23
priyanka	sonia	24

j. son/2.

%X is son of Y

son(X,Y):-parent(Y,X),male(X).

son(X,Y)		
X	Y	
javaharlal	motilal	1
javaharlal	swarupmati	2
sanjay	indira	3
sanjay	firoz	4
rajiv	indira	5
rajiv	firoz	6
varun	sanjay	7
varun	menka	8
rahul	rajiv	9
rahul	sonia	10

k. daughter/2.

%X is daughter of Y

daughter(X,Y):-parent(Y,X),female(X).

daughter(X,Y)		
X	Y	
vijyalakshmi	motilal	1
krishna	motilal	2
vijyalakshmi	swarupmati	3
krishna	swarupmati	4
indira	javaharlal	5
indira	kamla	6
tara	vijyalakshmi	7
lekha	vijyalakshmi	8
rita	vijyalakshmi	9
tara	ranjit	10
lekha	ranjit	11
rita	ranjit	12
priyanka	rajiv	13
priyanka	sonia	14

3. Answer the following queries

a. Find all females in the given tree

female(X)

female(X)	
X	
sonia	1
swarupmati	2
kamla	3
indira	4
menka	5
priyanka	6
vijyalakshmi	7
tara	8
lekha	9
rita	10
krishna	11

b. How many grandchildren do motilal have?

grandparent(motilal,Z)

grandparent(motilal,Z)	
Z	
indira	1
tara	2
lekha	3
rita	4

c. Who is/are sister of lekha?

sister(X,lekha)

sister(X,lekha)	
X	
tara	1
rita	2

d. Who are the parents of tara?

parent(X,tara)

parent(X,tara)	
X	
vijyalakshmi	1
ranjit	2

e. Who are cousins of rajiv?

cousin(X,Y):-grandparent(Z,X),grandparent(Z,Y),X\=Y,parent(W,X),not(parent(W,Y)).

cousin(X,rajiv)	
false	