CSE 259 - Logic in Computer Science
Fall 2024

Recitation-11

Project-4: Family Kinship

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Project-4

- You need to listen a song called **I'm My Own Grandpa,** summarize claims in the song and write Prolog program to verify them.
- Facts in the song and the relevant kinship definition rules **must be included**.

Project-4: Song details

I’m My Own Grandpa

Lyrics: Dwight Latham, Moe Jaffe
Music: Dwight Latham, Moe Jaffe

Covered by Jerry Garcia with David Grisman
Hip-hop version by Queue Luu Breeze

Song: https://www.youtube.com/watch?v=eYlJH81dSiw

Project-4: Song lyrics

Oh, many, many years ago
When I was twenty-three
I was married to a widow
Who was pretty as can be

This widow had a grown-up daughter
Who had hair of red
My father fell in love with her
And soon the two were wed

This made my dad my son-in-law
And changed my very life
For my daughter was my mother
Cause she was my father's wife

To complicate the matter
Though it really brought me joy
I soon became the father
Of a bouncing baby boy

This little baby then became
A brother-in-law to dad
And so became my uncle
Though it made me very sad

For if he was my uncle
Then that also made him brother
Of the widow's grown-up daughter
Who of course is my step-mother

My father's wife then had a son
Who kept them on the run
And he became my grandchild
For he was my daughter's son

My wife is now my mother's mother
And it makes me blue
Because although she is my wife
She's my grandmother too

Now if my wife is my grandmother
Then I'm her grandchild
And every time I think of it
It nearly drives me wild

For now I have become
The strangest case you ever saw
As husband of my grandma
I am my own grandpa

[Chorus]
I'm my own grandpa
I'm my own grandpa
It sounds funny I know
But it really is so
Oh, I'm my own grandpa

Project-4: Project description

- **Minimize** the number of facts and **maximize** the number of rules.
- Some predicate name you may want to use:
  grandparent/grandmother/grandfather/parent/father/mother/sibling/brother/sister/

  uncle/son/daughter/grandchild/son_in_law/spouse
- Sample testing cases:
  - runIt :- daughter(redhair,i), mother(redhair,i), son_in_law(dad,i), brother(baby, dad), uncle(baby,i), brother(baby,redhair), grandchild(onrun,i), mother(widow,redhair), grandmother(widow,i), grandchild(i,widow), grandfather(i,i).

Project-4: Sample output

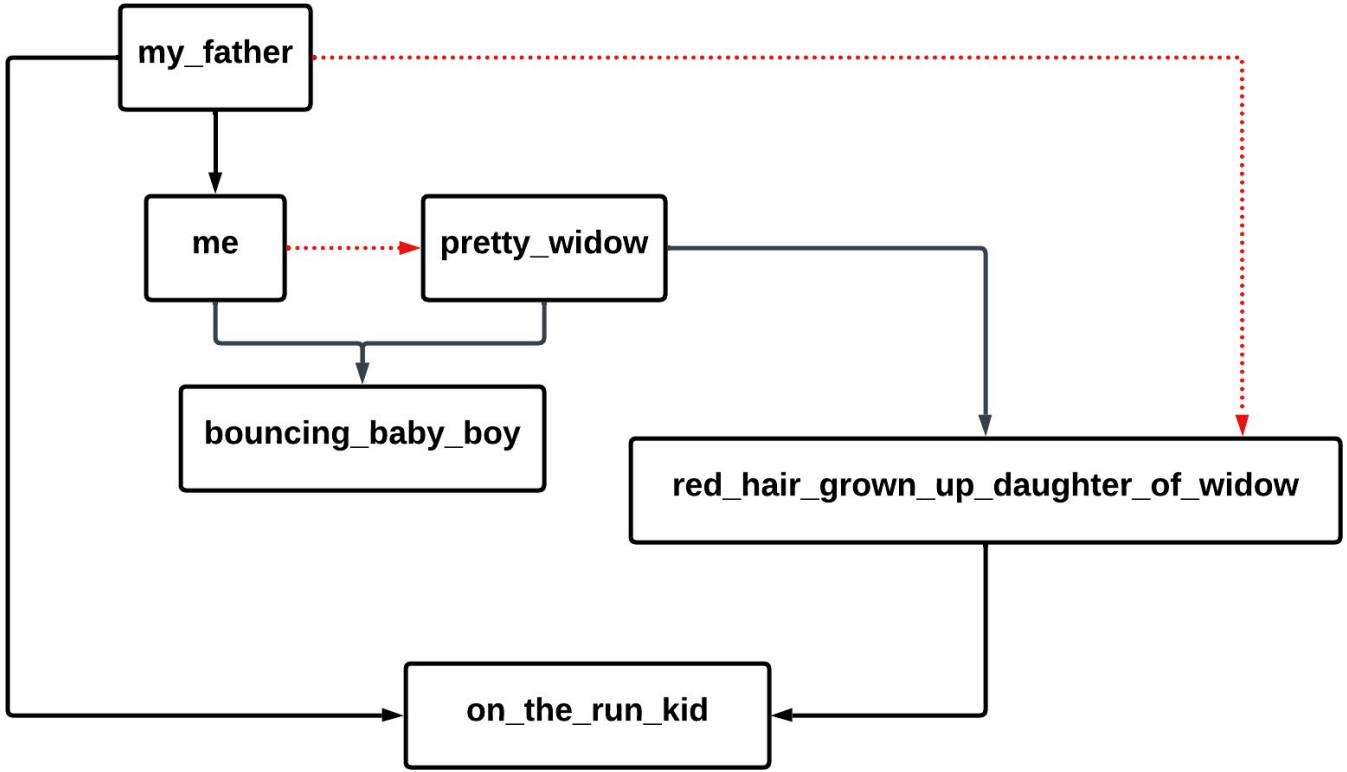
```
yes
| ?- runIt.

Is redhair the daughter of i ?: true
Is redhair the mother of i ?: true
Is dad the son in law of i ?: true
Is baby the brother of dad ?: false
Is baby the uncle of i ?: true
Is baby the brother of redhair ?: true
Is onrun the grandchild of i ?: true
Is widow the mother of redhair ?: true
Is widow the grandmother of i ?: true
Is i the grandchild of widow ?: true
Is i the grandfather of i ?: true

Is John his own grandfather ?: true


yes
```

Project-4: Diagram of the situation



Project-4: Some hints

- We need to maximize the number of rules and minimize the number of facts. If you observe carefully, we could just write a ton of facts to make a prolog version of the song. But we will be smart and write rules so that we can reduce the number of facts.

- We need to define the relationships using rules.

Project-4: Some hints contd.

- We can use some of these rules,
  - wife(X, Y)
  - married(X, Y)
  - parent(X, Y)
  - parent_in_law(X, Z)
  - step_parent(X, Y)`
  - biological_parent(X, Y)
  - grandparent(X, Z)
  - sibling(X, Y)
  - sibling_in_law(X, Y)
  - uncle_aunt(X, Z)

Project-4: Writeup

- The write up is like a project report.
- Introduction (provide an overview 1-2 paragraphs)
- Background (Some background details of the project and your implementation. 1-2 paragraphs)
- Implementation (design and coding paradigms. 2 - 4 paragraphs)
- Testing (test cases and expected output 1- 3 paragraphs)
- Conclusion (summary 1 paragraph)
- Do not make it more than (a maximum of) 3 pages in text.

Project-4: Writeup contd.

- Some explanation, introduction. What is your understanding to the song or/and to your implementation.
- What are the facts you implemented? Who (entities) are involved in the facts?
- What are the rules you wrote? What kind of relationship you implemented?
- What is the main query you want us to run during test, and what is the expected output?

Project-4: Sample writeup

```
This program is based on the "I'm My Own Grandpa" by the artist Ray
Stevens.
In the song he explains the complications of how he becomes the
grandparent to himself.

The code has pre-written the kinship relationship rules that has been
listed in the song.

/*facts*/
The program defines
two spouse facts: spouse(i,widow), and spouse(dad,redhair),
two female facts: widow, redhair,
four male facts: i, dad, onrun, baby,
and
four children facts: child(redhair,widow), child(i,dad), child(onrun,dad),
child(baby,i).

/*rules*/
The rules of the program have been written to define
in what condition is someone a child, a parent, a grandparent and other
relations.
Rules have been made using if statements where the predicate argument is
followed by the condition in which they are true.
The rules are defined in different sections: parents, children, siblings,
```

Project-4: What to submit

- The pl file (80% marks)
- A readme with team information and contribution of each members
- A report (20% marks)