ITSE301 Logic Programming

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البداية مع لغة برولوج

Prolog

Programing in Logic

Outline

- ➢ Language Characteristics
- ➢ Language Elements عناصر اللغة
- ➢ Executing Prolog تنفيذ البرامج
- ➢ Rules القواعد
- ➢ A Database in Prolog
- ➢ Recursive Rules
- ➢ Operators

Characteristics

➢ Prolog is based on first-order logic.

➢ لغة برولوج مبنية على المنطق البسيط

➢ Every program is a set of Facts and Rules.

➢ البرنامج عبارة عن مجموعة من الحقائق والقواعد

➢ Inference is by resolution.

➢ Search is by backtracking with unification.

➢ Basic data structure is term or tree.

SWI-Prolog

➤ To load a file:

   ?- consult('D:\\prolog\\test'). Or :-['filename'].

➤ For help:

   ?-help(predicate-name).

➤ " ; " will give you next solution.

   ?- listing(predicate-name) %will give definition.

Language Elements
عناصر لغة البرولوج

➢ Term: is a constant or a variable

➢ المفردة هي عبارة عن ثابت او متغير

➢ Facts and Rules: use terms as data structures

➢ الحقائق والقواعد تستخدم المفردات كهياكل بيانات

➢ Predicates: made up of facts and rules

➢ المسندات: تتكون من الحقائق والقواعد

➢ The (Logic) Program: made up of predicates

➢ البرنامج المنطقي يتكون من مجموعة من المسندات

المفردات البسيطة Terms

Terms are:

➢ Constants : begin with small letter الثوابت تبدأ بحرف صغير او تكون رقم او قائمة خالية او اي شئ بين علامة تنصيص فردية

  ❖ ali   libya 5   3.14   []   ´Ali'

➢ Variables: begin with uppercase or underscore

➢ المتغيرات تبدأ بحرف كبير او شارحة تحتية

  ❖ X   Y   List   _12   _A   _

➢ Compound terms

  ❖ plus(2,3)

  ❖ course(java, time(monday, 8, 10), ali, g02).

  ❖ 2+3   // infix notation

Facts

➢ A fact has the form $p(t_1,...,t_n)$.

❖ p is the name of the fact

❖ $t_1, ..., t_n$ are term arguments of the fact

➢ Examples:

teaches(a, b).

parent('Ali', salama).

note the '.'s

Example

> Facts:
> - ❖ likes(hend,school).
> - ❖ likes(hend,bananas).
> - ❖ likes(hend,hend).
>
> Queries
> - ❖ ?- likes(X,Y).
> - ❖ X=hend, y=bananas   % hit ";" for more
> - ❖ ?- likes(X,X).
> - ❖ X=hend.

Defines a *predicate* **likes** of *arity* 2
- ❖ likes/2 for short

Example

➢ Facts:

   likes(awatif,school).

   female(awatif).

   female(mariam).

➢ Rules

   ❖ likes(hend,X) :- likes(X,school). % :- = if

   ❖ likes(hend,X):- female(X), likes(X, bananas).

➢ Query:

   ? - likes(hend,Y).

   Y = ?? ;

   no.

Family Example

father(ali,salama).

father(salem, fatima).

mother(hend,salama).

mother(salama,fatima).

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

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

grandmother(X,Y):-

xxxxxxxxxxxxxxxxxxxxx.

% Add your own facts for practice.

Unification of terms
مطابقة الفقرات

➢ Two terms UNIFY if there is a common substitution which makes them identical.

➢ يمكن مطابقة اي فقرتين اذا امكن استبدال اي منهم بالاخر

➢ ?- f(X,Y) = f(ali,salem).

X = ali,

Y=salem

❖ A variable matches anything

❖ المتقير يمكن مطابقته مع اي شئ اخر

❖ predicate symbols only match identical predicate symbols.

❖ المسند يمكن مطابقته مع مسند بنفس الاسم فقط

Summary

➢ Program is facts + rules.

➢ Query = conjunct of predicates.

➢ First set of bindings for variables that solve query are reported. If none, then Prolog returns no.

➢ Use ";" to get other solutions.

➢ Can be viewed as constraint satisfaction program.

Download Prolog

www.swi-prolog.org