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Topics Covered

Prolog
Prolog Syntax
Prolog execution

Prolog

- Prolog is a logic programming language.
- It has important role in artificial intelligence.
- Unlike many other programming languages, Prolog is intended primarily as a declarative programming language.
- In prolog, logic is expressed as relations (called as Facts and Rules).
- Core heart of prolog lies at the logic being applied.
- Formulation or Computation is carried out by running a query over these relations.

Prolog Syntax

- A program, or *database,* in Prolog consists of one or more *predicates;* each predicate consists of one or more *clauses.* A clause is a *base clause* if it is unconditionally true, that is, it has no "if part."

  <program> ::= <predicate> | <program><predicate>
  <predicate> ::= <clause> | <predicate><clause>
  <clause> ::= <base clause> | <nonbase clause>

- Two clauses belong to the same predicate if they have the same *functor* (name) and the same *arity* (number of arguments). Thus, mother(jane) and mother(jane, jim) are different predicates.

  <base clause> ::= <structure> **.**
  <nonbase clause> ::= <structure> **:-** <structures> **.**
  <structures> ::= <structure> | <structure> **,** <structures>

Prolog syntax

- A *structure* is a functor followed by zero or more arguments; the arguments are enclosed in parentheses and separated by commas. *There must be no space between the functor and the opening parenthesis!* If there are no arguments, the parentheses are omitted.

  <structure> ::= <name> | <name> (<arguments>)
  <arguments> ::= <argument> | <argument> **,** <arguments>

- Terms (Data objects)
  - Atoms
    - (symbolic) constants
      - » E.g., anna, x_25, 'Tom_', ::=, <--->, etc
    - Numbers
      - » E.g., -25, 100.25e+5, etc
    - Variables
      - » E.g., X, Result, _23, _, AnonymousVariable, etc
  - Structures
    - » E.g., f(X,23,g('Tom',2)), etc
- Formulae (Predicate-logic clauses)
  - Facts
  - Rules

Prolog syntax

- Arguments may be any legal Prolog values or variables.A *variable* is written as a sequence of letters and digits, beginning with a capital letter. The underscore (_) is considered to be a capital letter.

- An *atom* is any sequence of letters and digits, beginning with a lowercase letter.

- Alternatively, an atom is any sequence of characters, enclosed by single quotes ('); an internal single quote must be doubled.
- Examples: cat, r124c41, max_value, maxValue, 'max value', 'Don''t go'.

- As syntactic sugar, Prolog allows certain infix operators: ',' (comma), ';' (semicolon), ':-' (turnstile), +, -, *, /, =, ==, and many others. These are the same as the operator written as the functor of a structure; for example, 2+2 is the same as '+'(2,2).

- *Comments* begin with the characters /* and end with */. Comments are not restricted to a single line, but may not be nested.

Prolog execution

- Most Prolog clauses have both a *declarative reading* and a procedural reading. Whenever possible, the declarative reading is to be preferred.

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

- Declarative reading: X is the mother of Y *if* X is a parent of Y *and* X is female.