

PRACTICAL 1

Introduction to PROLOG

Definition:-

Prolog is a logic programming language. Prolog, which is short for programming logic, is a programming language used in creating artificial intelligence. Prolog is classified as a logic programming language and relies on the user to specify the rules and facts about a situation along with the end goal, otherwise known as a query.

History:-

Prolog was designed in the 1970s by Alain Colmerauer and a team of researchers with the idea - new at that time - that it was possible to use logic to represent knowledge and to write programs. More precisely, Prolog uses a subset of predicate logic and draws its structure from theoretical works of earlier logicians such as Herbrand (1930) and Robinson (1965) on the automation of theorem proving. Prolog was originally intended for the writing of natural language processing applications. Because of its conciseness and simplicity, Fifth generation projects in Japan, Europe and US followed.

Prolog Clauses:-

- Any factual expression in Prolog is called a clause.
- There are two types of factual expressions: facts and rules

There are three categories of statements in Prolog:

- ☐ Facts: Those are true statements that form the basis for the knowledge base.
- ☐ Rules: Similar to functions in procedural programming (C++, Java...) and has the form of if/then.
- ☐ Queries: Questions that are passed to the Interpreter Access the knowledge base and start the program

Facts:-

Syntax rules:

1. The Names Of all relationships and objects must begin with a lowercase letter .For Example:
likes,john,rachel.
2. The relationship is written first ,and the objects are written separated by commas,and the objects are enclosed by a pair of round brackets.
3. The character '.' must come at the end of each fact.

Terms to understand:

1. The names of the objects that are enclosed within the round brackets in each fact are called arguments.
2. The name of the relationship, which comes just before the round bracket, is called the predicate.
3. The arguments of a predicate can either be names of objects (constants) or variables.
4. When defining relationships between objects using facts, attention should be paid to the order in which the objects are listed. While programming the order is arbitrary, however the programmer must decide on some order and be consistent.
5. Example: ~~likes(ram,sita).~~ >> The relationship defined has a different meaning if the order of the objects is changed. Here the first object is understood to be the "liker". If we wanted to state that sita also likes ram then we would have to add to our database - likes(sita,ram).
6. Remember that we must determine how to interpret the names of objects and relationships.

Data objects:

- Atom-String characters are made up of upper-case letters, lower-case letters, digits, and the underscore character that begins with a lowercase letter.

- Variables-A Variable is a string of upper-case letters, lower-case letters, digits and underscore characters that starts either with an upper-case letter or with underscore.
- Numbers - Prolog implementations do support floating point numbers or floats and integers (that is: ... -2, -1, 0, 1, 2, 3, ...) are useful for such tasks as counting the elements of a list.
- Structure-Objects with several components. E.g. animal(cat, domestic(yes)).

A Prolog program consists of two or more sections:-

Clauses Section :

- The Main body of the prolog program.
- Contains The Clauses That Define The Program-facts and rules. Example: - likes(tom,anna).

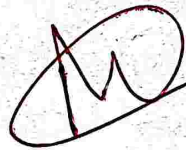
Predicates Section :

- Predicates(relations)used in the clauses section are defined.
- Each relation used in the clauses of the clauses section must have a corresponding predicate definition in the predicates section. Except for the builtin predicates of Prolog. Prolog requires that each predicate in the predicate section must have at least one clause in the clauses section.
- Predicate definition in the predicates section does not end with a period.
- Predicate definitions contain different names than those that appear in the clauses section.
- Examples: Predicates Section - likes(boy, girl) // here "likes" is predictor.

Application Areas :-

Prolog has been a very important tool in:

- Artificial intelligence applications
- Expert systems
- Natural language processing
- Smart information management
- Systems business rules
- Security access control policies



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