Laboratory Manual

For

Knowledge Systems

(IT 714)

B.Tech (IT)

SEM VII

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Sample experiment

1. Aim:- To make a knowledge system for medical diagnosis . The system should store the various disease and their symptoms. On being prompted system should respond with information related to symptoms of a given disease.

2. Tools / Apparatus: Turbo Prolog GUI software.

3. STANDARD PROCEDURES:

3.1 Analyzing the Problem:
Analyze real life system and find out the various facts and rules in the system to be designed. Find the various attributes (variables) needed to store this information.

3.2 Designing solution:
Define the contents of   three sections of prolog program as follows-
1. Define Domain section :-
   Define various variables and symbols needed for problem.
   (Similar to definition part of conventional programming)
   In given example, there are two symbolic names needed to store the disease and indication parameters .

2. Define Predicates:-
   Different relation between symbols and variables are to be declared .
   (similar to defining function prototype in conventional programming)
   For example:- in given example there is only one relation namely symptom between disease and indication.

3. Define Clauses:-
   Various facts and rules supporting the predicates declared are to be defined . For example:- various facts indicating symptoms of various disease are found and stored as facts .The format for storing facts is same as defined in predicates section.

3.3 Implementing ,compiling and executing the Solution
o   Start Turbo Prolog
o   Select the Edit mode
o   Type in the program

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- Exit the Editor using Esc.
- Save the program
- Select Run (which compiles the program for you in memory)
  - Once you have followed these steps you will see the following prompt in the Dialog Panel:

    Goal:

  - Using a Prolog program is essentially about asking questions. To ask the executing Prolog program a question you specify the Goal.

3.4 Testing the solution

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- If the goal is symptom (X,runny_nose), it should respond with all the matching indications of runny_nose after looking up in the facts stored in the clauses section,as shown in above snapshot.

- Turbo Prolog will respond with True and prompt for another goal.

- Possible outcomes of specifying a goal:

    1. The goal will succeed; that is, it will be proven true.

    2. The goal will fail; Turbo Prolog will not be able to match the goal with any facts in the program.

    3. The execution will fail because of an error in the program.

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Tools / Apparatus: Turbo Prolog GUI software .

EXPERIMENT1

Aim:- Turbo Prolog features and format.

Procedure:-

- Write a simple prolog program to study fact, verification, domain, predicate and clauses section.(see program on pg 41 of book)

Example:-

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EXPERIMENT2

Aim:- WAP Using   variables in Prolog
Procedure:-

- Write a Prolog program containing facts related to following predicates

a) Location (city, state)
b) Stays (person, city) in clauses section.
Display (i) list of person, state and city

        Example:-

                Output:- Person= ram   City=anand   State=Gujarat
                          Person= Lakshman City=anand State=Gujarat
                          Person= Seeta   City=Baroda State=Gujarat
                          Person= Ravan City=Columbo State=Srilanka

        (ii) Given person staying in which state .
          Example:-
              Output:- Person= ram State=Gujarat

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EXPERIMENT3

Aim:- WAP for Usage of rules in Prolog
Procedure:-
   ->Create a family tree program(of EXP2) to include following rules –

- M is the mother of P *if* she is a parent of P and is female
- F is the father of P *if* he is a parent of P and is male
- X is a sibling of Y *if* they both have the same parent.
- Then add rules for grandparents,uncle-aunt,sister and brother .

Based on the facts , define goals to answer questions related to family tree.

Example:- Suppose family tree is as follows-
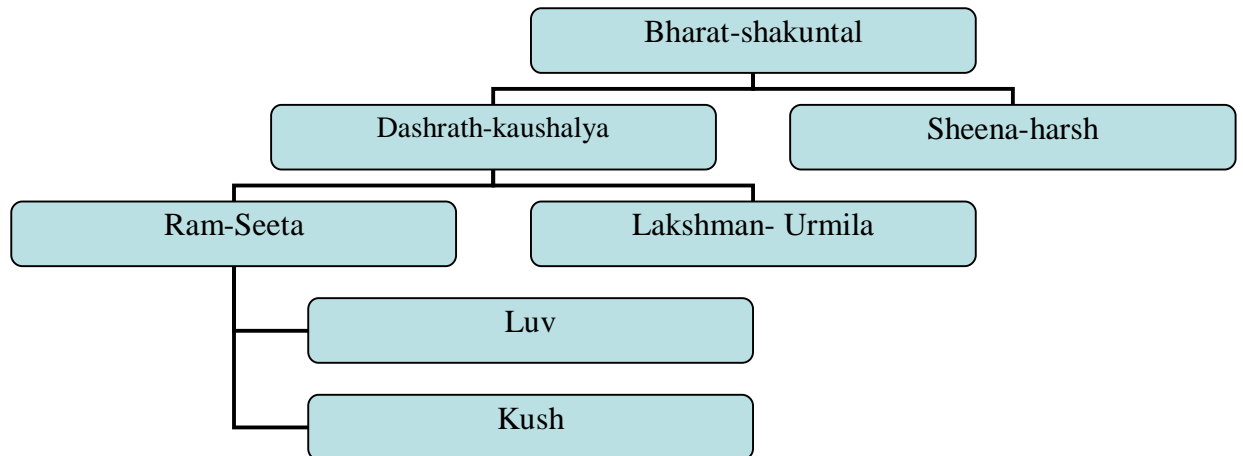
Output:- goal :-grandfather(Luv,X)   goal:-uncle(luv,X)

                    X=Dashrath   X=lakshman

          Goal:-father(Luv,X)

                    X=Ram

          Goal:-sibling(luv,X)

                    X=kush

          Goal:-aunt(luv,X)

                    X=Urmila

EXPERIMENT4

Aim:- WAP for using Input, Output and fail predicates in prolog -
Procedure:-

Write program using write, writef, readint,readchar,readln ,readreal predicates

- Store facts of employee name, age, job location, marital status and gender.
  Display (i) list of married & unmarried employees
  - (ii) List of male & female employees
  - (iii) List of employees for given job location

      Example:-   Output :-
                    *********OPTIONS**********
      1. Display list of married employees
      2. Display list of unmarried employees
      3. Display list of male employees
      4. Display list of female employees
      5. Display list of employees at a given location
      Enter your choice:-
          5
       Enter location :-
       Anand
      List of employees staying at "anand" are
        Sr No. Name of employee
        1. Ram
        2. Lakshman
        ………

- Create a small set of facts and rules on who is the ancestor of whom.
   Display i) who is ancestor of given person.
           ii) Complete list i.e who is ancestor of whom.

   Example:-[with reference to above given family tree in experiment3)
           i) Input person's name-Luv
                Output :- Ancestors of "luv" is-
                        Ram ,Lakshman

            ii) Output:- person   Ancestor
                        Luv   Ram ,Lakshman
                        Ram   Dashrath   ,Sheena
                        Lakshman   Dashrath,Sheena
                        Dashrath   Bharat

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EXPERIMENT5

Aim:- Write programs for studying Usage of arithmetic operators in Prolog
Procedure:-Write programs to-
*   Accept name of the student, rollno, his subject name ,maximum marks and
    obtained marks in the subject. (Take marks of atleast 6 subjects) . Compute the
    percentage of a student. Display his result with other information. Use variables,
    arithmetic operators, I/O predicates appropriately.

    Example:-
        Output:- Enter name of student:- "ram"
                Enter roll number of student-IT1
                Enter subject information for 6 subjects :-
                 Subject name-   "daa" Max marks:-150 Obtained marks:-120
                 Subject name- " oopd"   Max marks:-150 Obtained marks:-110
                 Subject name- " cn"   Max marks:-150 Obtained marks:-100
                 Subject name- " dc"   Max marks:-100 Obtained marks:-60
                 Subject name- " amp"   Max marks:-150 Obtained marks:-140
                 Subject name- " cpi"   Max marks:-150 Obtained marks:-30
             **********RESULT***************
               Student name:-"ram" Roll no-"IT1"
               Subject names-"daa" ,"oopd", "cn","dc","amp","cpi"
              Total max marks-….   Total Obtained marks- ….
             % percentage - ……

*   Accept department, designation, name, age, basic salary, house rent
    allowance(HRA) of an employee . Compute dearness allowance (DA) which is
    15% of basic salary . Determine the gross salary(basic salary+HRA+DA) of the
    employee. Display all information of the employee.
     (Use variables, rules, I/O predicates, arithmetic operators as per needed).

    Example:-
        Output:- Enter employee name:- xyz
                Enter department :-IT
                Enter age:-43
                Enter basic salary-50,000
              Enter HRA:- 2000

              PAYSLIP
              Employee Name is –xyz
              Department-IT
              BA-50,000
              DA - 7500
              HRA-2000
              Gross salary- 59500/-

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EXPERIMENT6

Aim :- Write program to study usage of cut,not,fail predicates in prolog.

Procedure:-

Write a prolog program having facts in clauses section for predicate
 student(studentname,branchname) .Use cut !, fail, not predicates to→

- Display list of all students
- Display list of students for given specific branch.
- Display list of students excluding specific branch

Example:- Output:- ***********MENU**********************
                  1) Display list of all students
                  2) Display list of students for given specific branch.
                  3) Display list of students excluding specific branch
                  Enter your choice-
                  3
                  Enter branch name to be excluded from result –
                   CE
                  List of all students except from CE branch are ->
                           Student name- Department
                            Harsh – IT
                            Deep-EC
                            Heena-IC
                Do you want to continue?
                "y"
                  ***********MENU**********************
                  1) Display list of all students
                 2) Display list of students for given specific branch.
                 3) Display list of students excluding specific branch

                 Enter your choice-2
                 Enter name of branch for which student list needed –
                 CE
                 List of all students in CE branch are ->
                         Student name- Department
                          Amardeep – CE
                         Anand-CE

                 Do you want to continue?
                "y"
                  ***********MENU**********************
                  1) Display list of all students

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2) Display list of students for given specific branch.
3) Display list of students excluding specific branch
Enter your choice-1
                Student name- Department
                Harsh – IT
                 Deep-EC
                 Heena-IC
                Amardeep – CE
                Anand-CE

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EXPERIMENT 7

Aim:-Write program to study usage of recursion in prolog

Procedure:-

- Write predicate fact(n) ,which finds and display factorial of a given
  number .
  Example:- Output:-
   Goal :- fact(5)
           5 != 5*4*3*2*1= 120 .

- Write predicate fibbonacci (n) ,which finds the series for first "n" values .
   Example:- Output:-
  Total number of numbers needed in output?
          6
  Fibonacci series of first '6' numbers:-
          "1,1,2,3,5,8"

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EXPERIMENT 8

Aim:-Write programs to study usage of logical , arithmetic ,string operators in Prolog .

Procedure:-

- Write a predicate max(num1,num2,num3) which finds and displays maximum number from three given numbers and min(num1,num2,num3) which finds and displays minimum number of three given numbers ,use logical operators.

    Example : Output

    Enter three numbers : 1 2 3

    maximum is "3" , minimum is "1"

- Write a predicate which accepts integer number as an input and displays its square .It should also find its positive square root value ,if its sqrt is integer, otherwise display 'NA' .Use arithmetic operators /in-built conversion predicates to achieve this.

    Example1 :- Output:-

    Enter no. : 3

    3(number) , 9 (square) ,NA(square root not

    possible)

    Example1 :- Output:- Enter no. 4

    4 (number),   16 (square) ,   2(square root)

- Write a program to find substring from a given string. The substring should start from 1st location of source string and should contain the entered number of characters from the source string.

    Example:-

    Output:-Enter source string:

    "tested"

    Enter number of charcthers needed in substring:

    "4"

    Original String is : "tested"

    Substring is "test"

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EXPERIMENT 9

Aim:- WAP for studying usage of 1) compound object and 2) list   in prolog

Procedure**:-**
1) Write a program to maintain inventory items using a **compound object.**
   The format of compound object should be
                (item type, item (no, description, qty, cost))
              Item-type can be fg-finish good, sf-semi finish good, rm-raw material,
   Write appropriate predicates to
   i) Accept from user the details of atleast 10 such objects
   ii) Display the details of objects entered by user.
   Example:-
           Output:- enter information of 10 items
                   Enter item type …..
                   Enter item number …..
                   Enter item description…..
                   Enter quantity of item….
                  Enter cost of item…..

              ………………………..
              ………………………………
              The details of objects entered are as follows-→

Item type	Item number	description	quantity	cost
Fg	1	keyboard	10	2000
Rm	2	plasticbox	10	300
Sf	3	keypad	10	500

2) Find and display odd and even numbers from a given input list of integers
  Example:-
           Output:- Enter list of 10 integer numbers
                    1 2 3 4 5 6 7 8 9 10
                   Even numbers ->   2,4,6,8,10
                   Odd numbers-> 1,3,5,7,9

EXPERIMENT10

Aim:- WAP for studying usage of dynamic database in prolog

Procedure**:-**
- Store facts of student(name, branch, semester , percentage) dynamically.
- Use asserta predicate to enter new data in dynamic database.
- Use retract predicate to delete a given data from dynamic db.
- Create appropriate predicate to search and display some specified students details.
- Create appropriate predicate to list all the students having percentage greater than some specified value.

Example :- Output:-

*********************MENU***********************
1) enter new student details
2) delete a student data
3) display specific student details
4) list of students having % greater then specified %
5) Exit
Enter your choice:-
   4
Enter minimum % -
   60
The student details having % greater than "60 " are
 Std name std branch semester   %
  Ram   IT   7   61
  Lakshman CE   7   69
………………
Do you want to continue? (y/n)
y
*********************MENU***********************
1) enter new student details
2) delete a student data
3) display specific student details
4) list of students having % greater then specified %
5) Exit
Enter your choice:-
   2
Enter student name to be deleted:-
   Ram
Record deleted successfully .
Do you want to continue? (y/n)

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y

*********************MENU*************************

1) enter new student details
2) delete a student data
3) display specific student details
4) list of students having % greater then specified %
5) Exit

Enter your choice:- 5

Thankyou …have a good day

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EXPERIMENT 11

Write a prolog program to solve a murder mystery problem. Design a system which stores rules to judge a person as culprit. Rules can be like- the person should have access to weapon by which murder was done, he should be at the crime site at the occurrence of crime, and he had a motive to conduct the crime and so on. Then based on facts and rules, the culprit should be identified.

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EXPERIMENT 12

Expert system for household appliances- The problems can be related to any house hold appliance like refrigerator. The problems can be like led not glowing, not cooling properly, not defrosting etc. The system should store a set of symptoms related to a particular problem and its solution. Then it should ask a series of questions and attempt to diagnose the problem, based on the indications of problem reported by user.

References

- Introduction to turbo prolog
  - Carl Townsend. – bpb publications
- Artificial Intelligence
  - Rich and Knight – tata mcgraw hill

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