Sardar Vallabhbhai National Institute of Technology

LAB 7 : LOGICAL AGENT

PART A: Exposition Problems

1. **Classics Example of Logical Programming**

   - Movie database : provides a couple of thousands of facts about movies for you to query.
   - Eliza: implements the classical shrink.
   - Expert system: illustrates simple meta-interpretation of rules and asking for missing knowledge.

   [Visit : https://swish.swi-prolog.org/ and the Google drive link for.pl files]

PART B : Conceptual Questions

2. Run the sample example given.

   a) discuss the sample example given of Sam's likes and dislikes in food.
   b) Identify the facts in the sample example.
   c) Identify the rules in the taken example.
   d) Run what does Sam likes.
   e) Sem likes curry.
   f) Add a new rule that Mohit eat whatever Sem likes.
   g) Tracing the execution of a Prolog query allows you to see all of the goals that are executed as part of the query, in sequence, along with whether or not they succeed. Show the steps occur in the above program.

3. Consider the following Knowledge Base:

   The humidity is high or the sky is cloudy.
   If the sky is cloudy, then it will rain.
   If the humidity is high, then it is hot.
   It is not hot today.
   Query : Will it rain today ?

4. Write prolog program to find if the given sentences is valid or not:

   - If I am the Student President then I am well-known. I am the Student President. So I am wellknown.

   - If I am the Student President then I am well-known. I am not the Student President. So I am not well-known.

- If Rajat is the Student President then Rajat is well-known. Rajat is the Student President. So Rajat is well known.

- If Asha is elected VP then Rajat is chosen as G-Sec and Bharati is chosen as Treasurer. Rajat is not chosen as G-Sec. Therefore Asha is not elected VP.

- If Asha is elected VP then Rajat is chosen as G-Sec and Bharati is chosen as Treasurer. Rajat is chosen as G-Sec. Therefore Asha is elected VP.

- Wherever Mary goes, so does the Lamb. Mary goes to School. So the Lamb goes to School.

- No contractors are dependable. Some engineers are contractors. Therefore some engineers are not dependable.

- Every passenger is either in first class or second class. Each passenger is in second class if and only if the passenger is not wealthy. Some passengers are wealthy. Not all passengers are wealthy. Therefore some passengers are in second class.

- All dancers are graceful. Ayesha is a student. Ayesha is a dancer. Therefore some student is graceful.

5. Construct your family tree diagram (start from grandparents to your siblings). and formulate definitions for a human family tree using relations 'male', 'female', 'parent', 'father', 'mother', 'sibling', 'grandparent', 'grandmother', 'grandfather', 'cousin', 'aunt', and 'uncle'. Let 'male', 'female', 'parent' be the fundamental relations and define the others in terms of these. Write your information in facts in English.

6. Consider the following facts/statements. The law says that it is a crime for an American to sell weapons to hostile nations. The country Nono, an enemy of America, has some missiles, and all of its missiles were sold to it by Colonel West, who is American.

   Formulate this knowledge in First Order Logic. And use prolog program to execute following queries:
   a)Query : criminal(west)?
   b)Query: criminial(X)?
   Draw a resolution tree to find the answer of par (a)

PART C : Exploratory Problem [10 MARKS]

7. There is a famous problem in mathematics for coloring adjacent planar regions. Like cartographic maps, it is required that, whatever colors are used, no two adjacent regions may not have the same color. Two regions are considered adjacent provided they share some boundary line segment. Consider the following map.
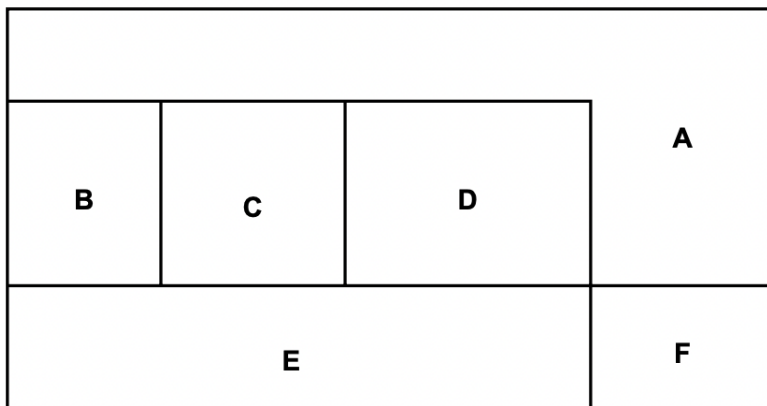
Develop a Prolog program that can compute all possible colorings (Given colors to color with) are Red ,Blue, Green and Yellow. [Hint : Covert it to graph first]