Everything on Rule-Based Systems

Architecture

A typical rule based system consists of the following:

1) **Knowledge Base (Also known as the rule base)**

   Contains rules about problem domain

2) **Database**

   Contains the set of facts about the problem

3) **Inference Engine**

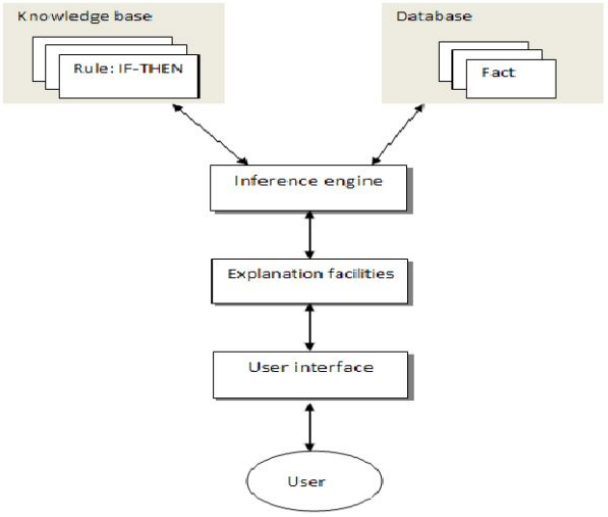
   Carries out the reasoning process by linking the rules with facts, to find the solution

4) **Explanation Facilities**

   Provides info to the user about reasoning steps followed

5) **User Interface**

   Communication between user and system



The part of the rule after the IF is called antecedent/premise (contains subgoals)

The part of the rule after the THEN is called conclusion

The inference process used in a rule based system is deductive inference. It has 2 approaches, Forward chaining and Backward chaining.

Forward Chaining

Reason forwards (Data driven reasoning); from facts to new conclusions

1) Problem with this approach is controlling it.
2) Identifying all rules is a matching problem
3) Deciding which rule to use is a conflict resolution problem
4) Combinatorial explosion

Useful when no specific goal is being explored

Backward Chaining

Goal-driven reasoning. Good if there is a specific goal

Process (IF A AND B THEN C):

1. To justify C apply rule to generate subgoals A and B
2. Attempt to justify subgoals in same manner, until all subgoals are facts in the database
3. Hence, initial goal is proven

Problems:

1. When alternative rules exist, order may matter
2. Many dead-ends may be tried before a solution is found