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Explanation for Forward Chaining Algorithm

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ForwardChaining Algorithm :

Parameters: the fact (to demonstrate)

if fact in BF then

  res = "SUCCESS"

else

  nonTriggeredRules = BR ;rulesToConsider = BR ; res = "FAILURE"

 while rulesToConsider !={} and res != "SUCCESS" do

Choose a rule to consider

  r = choose(rulesToConsider)

 # Remove the chosen rule from rulesToConsider

rulesToConsider = rulesToConsider - {r}

Check if all premises are in the base of facts

  if all(p in BF , p in premise(r)) then

Update the base of facts with the conclusion of the rule

 BF = BF+{conclusion(r)}

 # Remove the triggered rule from non-triggered rules

nonTriggeredRules = nonTriggeredRules - {r}

rulesToConsider = nonTriggeredRules

 if conclusion(r) == fact then

res = "SUCCESS End if End if End while End if

Return(res)

Explanation:

Forward chaining is a reasoning technique used in artificial intelligence to infer new facts from a set of existing facts and rules. It starts with a known set of facts (**Base of Facts**, or **BF**) and a set of rules (**Rule Base**, or **BR**). These rules represent relationships between facts and allow the system to deduce new information.

The process works as follows:

1. **Initialize:** Start with the known facts in **BF** and the rules in **BR**.
2. **Check target fact:** Check if the target fact (the fact you want to prove) is already present in **BF**. If it is, the process is complete, and the target fact is proven.
3. **Rule iteration:** If the target fact is not yet proven, iterate through the rules in **BR**:

For each rule:

> - **Premise check:** Check if all the conditions (premises) of the rule are present in **BF**. This is done by checking if each premise is a subset of **BF**.
> - **Conclusion application:** If all premises are satisfied, add the conclusion of the rule to **BF**. This represents applying the rule and deducing new information.

4. **Repeat:** Repeat steps 2 and 3 until either the target fact is found in **BF** or there are no more rules left in **BR**.
5. **Result:** If the target fact is found in **BF** at any point during the process, the process is complete, and the target fact is proven. If the loop terminates without finding the target fact, no further conclusions can be drawn, and the target fact remains unproven.

Key points:

- **Forward chaining** starts with known facts and iteratively applies rules to infer new facts.
- It checks if rule premises are satisfied based on the current fact base.
- It updates the fact base with conclusions of applied rules.
- It stops when the target fact is proven or all rules are exhausted.