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Q1. Apply forward and backward chaining and prove that messy Loves orange.

i) Messy loves all type of fruits.
ii) Apples are fruits.
(iii) Bananas are fruits.
(iv) Anything anyone eats isn't bad is fruit.
(v) Sita eats orange and is good.
(vi) Renu eats anything Sita eats

Ans:-

i) $\forall x$ Fruits $(x) \rightarrow$ loves (Messy, x)
ii) fruit (Apples)
iii) fruit (Banana)
(iv) $\forall x \forall y$: eats $(x, y) \wedge \rightarrow$ bad $(x) \rightarrow$ fruit (y)
(v) eats (Sita, orange) $\wedge$ good (Sita).
(vi) $\forall x$: eats (Sita, x) $\rightarrow$ eats (Renu, x)

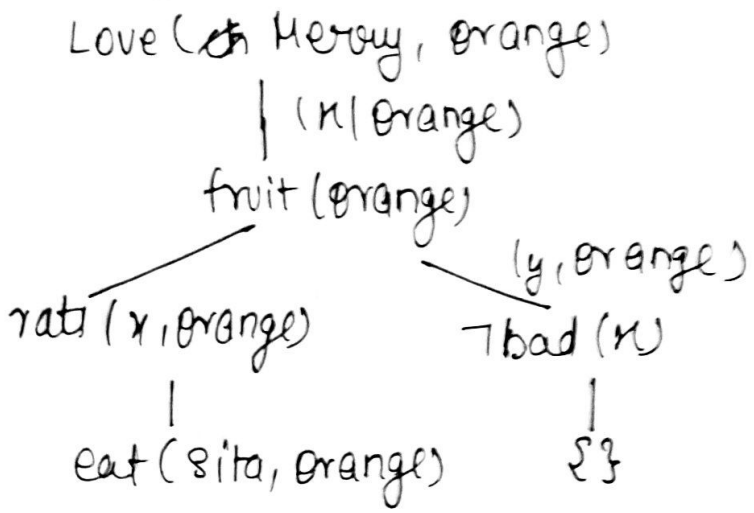
forward chaining:

loves (Messy, orange)

fruits (apple) fruit (Banana) eats (Renu, orange) fruit (orange)

eats (Sita, orange) good (Sita)

(2) Backward chaining:



Q2. Production based System:-

(i) A production system is based on set of rules about behaviour. These rules are basic representation found helpful in export system automated planning and action selection.

(2) Components of productions based system are:-

(i) Knowledge Base: Contains information relevant to a given problem.

(ii) Control strategy: determine the order in which roles are applied to database, provide a way of resolving conflict that can arise when several rules match at once.

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(iii) Rule Applier: Rule applier is a computational system that implements that control strategy and applies the rule.

(iv) Set of Production Rules -: The production rules operate on the global database each rule usually has a ~~pred~~ precondition that is either satisfied or not by global database. If precondition satisfies then rule is applied which changes the database.

(3) Features of Production System in AI

(i) Simplicity: Structure of each sentence is unique and uniform as they use "if-then" structure.

(ii) Modularity: This means the production rule code the knowledge available is in discrete pieces.

(iii) modifiability: This means the facility for modifying rules.

(iv) Knowledge intensive: The knowledge base of production system stores pure knowledge

Frame Based System -:

(1.) A frame is a data structure with typical knowledge about particular object or concept.

(2.) It is used to capture and represent knowledge in frame-based expert system.

(3) Frame provide natural way for structured and concise representation of knowledge.

(4.) In a single entity, a frame combines all necessary knowledge about particular object or concept.

(5.) Frame is collection of slots.

(6) Each slot describe particular attribute or operation of frame.

(7) Slots are used to store values.

(8) In general, slot may include information such as
(i) Frame name
(ii) Relationship between frames
(iii) Slot value
(iv) Slot value can be symbolic, numeric or boolean.
(v) Slot value can be assigned when frame created.

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(vi) Default slot value
(vii) Procedure is attached to frame which is executed if slot value is changed such procedures are called demons

Q3 (1) The dempster-: Shafer theory is designed to deal with the distinction between uncertainty and ignorance

(2) Rather than computing the probability of a proposition, it computes the probability that the evidence support the proposition

(3) Given that the coin might or might not be fair, what belief should you ascribe to the event that it comes-up heads. Dempster Shafer theory says that because you have no evidence either way, you have to say that the belief Bel(heads) == 0 and also that Bel(¬head) = 0.

(4) This makes dempster shafer theory skeptical in a way that has some intuitive appeal Now suppose you have an expert at your disposal who testifies with 90% certainty that the coin is fair. Then Bel(heads) = $0.9 \times 0.5 = 0.45$ and also Bel(¬heads) = 0.45 There is still a 10% gap not accounted for by the evidence.

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using Bayesian theorem.

$$P(T=1|A=1) = \frac{P(A=1|T=1)\cdot P(T=1)}{P(A=1)}$$

$$= \frac{P(A=1|T=1)\ P(T=1)}{P(A=1|T=1)\ P(T=1) + P(A=1|T=0)\ P(T=0)}$$

$$= \frac{0.98 \times 0.00001}{0.98 \times 0.00001 + 0.001 \times (1 - 0.00001)}$$

$$= 0.0097$$

$$\approx 0.01.$$