Lab-08

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① Create a knowledge base consisting of FOL statements & prove the given query using forward reasoning

Algorithm

function FOL-FC-ASK(KB, α)
returns a substitution or false
inputs: KB, the knowledge base a set of first order definite clauses α, the query, an atomic sentence
local variables: new, the new sentences inferred on each iteration
repeat until new is empty
new ← {}
for each rule in KB do
(p1 ∧ ..... ∧ pn => q) ← Standardize-Variables (rule)
for each θ such that SUBST(θ, p1 ∧ ... ∧ pn) = SUBST(θ, p1' ∧ ..... ∧ pn')
for some p1' ..... pn' in KB
q' ← SUBST(θ, q)
if q' does not unify with some sentence already in KB or new then add q' to new
φ ← unify(q', α)
if φ is not fail then return φ
add new to KB
return false

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i) for a given case study you should represent sentences in FOL & write a proof tree generated by forward chaining

as per the law, it is a crime for an American to sell weapons to hostile nations, country A an enemy of American, has some missiles and all the missiles were sold to it by Robert, who is an American citizen"

-> Representation in FOL

① It is a crime for an american to sell weapons to hostile nations
American(p) ∧ weapon(q) ∧ hostile(r) ∧ Sell(p, q, r) => criminal(p)

② country A has some missiles
∃x Owns(A, x) ∧ missile(x)
Owns(A, T1)
missile(T1)

③ All of the missiles were sold to country A by Robert
∀x Missile(x) ∧ Owns(A, x) => Sells(Robert, x, A)

④ Missiles are weapons
Missile(x) => weapon(x)

⑤ Enemy of American is known as hostile
∀x Enemy(x, American) => Hostile(x)

⑥ Robert is an American
American(Robert)