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LAB 6

Create a knowledge base using propositional logic and show that the given query entails the knowledge base or not Wumpus world's problem

Query 1: Is there a Pit at (1,2)?
Query 2: Is there a wumpus at (2,2)?

Algorithm Wumpus_Entailment(KB, α)
Purpose: Check whether the Knowledge base(KB) entails a query(α)
Input: KB - set of propositional sentences describing the wumpus world.
α - query sentence (e.g "P12" or "W22")
Output: true if KB⊨α, false otherwise.

Symbols ← all propositional symbols appearing in KB ∪ {α}
return Check_All(KB, α, symbols, {})

Procedure Check_All(KB, α, symbols, model)
if symbols is empty then
  if PL_True(KB, model) = true then
    return PL_True(α, model)
  else
    return true
else
  P ← first(symbols)
  rest ← remaining(symbols)
  return (Check_All(KB, α, rest, model ∪ {P=true}) and
    Check_All(KB, α, rest, model ∪ {P=false}))

Function PL_True(sentence, model)
Evaluate whether a propositional sentence is true in a given model

if sentence is an atomic symbol then
  if sentence in model then return model[sentence]
  else return undefined
if sentense is $\neg\phi$ then
  return NOT PL_True(ϕ, model)
if sentence is $(\phi \wedge \psi)$ then
  return (PL_True(ϕ, model) AND PL_True(ψ, model))
if sentence is $(\phi \vee \psi)$ then
  return (PL_True(ϕ, model) OR PL_True(ψ, model))
if sentence is $(\phi \rightarrow \psi)$ then
  return (NOT PL_True(ϕ, model) OR PL_True(ψ, model))
if sentence is $(\phi \leftrightarrow \psi)$ then
  return (PL_True(ϕ, model) = PL_True(ψ, model))

Output :-

Query	Result	Interpretation
P(1,2)	Entails ¬ P(1,2)	No pit at (1,2)
W(2,2)	Unknown	Not enough Information

Model where KB = True

P11	P12	P21	P22	P31	B11	B21	W22	KB	P12	W22
F	F	F	T	T	F	T	T	T	F	T
F	F	F	T	T	F	T	F	T	F	F
F	F	F	T	F	F	T	T	T	F	T
F	F	F	T	F	F	T	F	T	F	F
F	F	F	F	T	F	T	T	T	F	T
F	F	F	F	T	F	T	F	T	F	F

Full Truth Table

P11	P12	P21	P22	P31	B11	B21	W22	KB	P12	W22
T	T	T	T	T	T	T	T	F	T	T
T	T	T	T	T	T	T	F	F	T	F
T	T	T	T	T	F	F	T	F	T	T
T	T	T	T	T	F	F	F	F	T	F
T	T	T	T	F	T	T	T	F	T	T
T	T	T	T	F	F	F	F	F	T	F
T	T	T	T	F	F	F	T	F	T	T
T	T	T	T	F	T	T	F	F	T	F
T	T	T	F	T	T	T	T	F	T	T
T	T	T	F	T	F	F	F	F	T	F

Does KB entail P12?

=> False

Does KB entail W22?

=> False

27/10/25