UCS1504 - Artificial Intelligence Lab

Department of CSE, SSN College of Engineering

6. Inference from Knowledge Base

11.10.2022

1. Show that the hypotheses:
   - It is not sunny this afternoon and it is colder than yesterday. **¬s ∧ c**
   - We will go swimming only if it is sunny. **w → s**
   - If we do not go swimming, then we will take a canoe trip. **¬w → t**
   - If we take a canoe trip, then we will be home by sunset. **t → h**
   lead to the conclusion:
   - We will be home by the sunset. **h**

   a) Translate the statements into propositional logic. (Already given in **RED**)
   b) Write a formal proof, a sequence of steps that state hypotheses or apply **inference rules** to previous steps.
   c) Write the same above proof based on **resolution** also.

2. Using the Inference Rules

From	Can Derive	Abbreviation for rule
R, R → S	S	Modus Ponens- **mp**
R → S, S'	R'	Modus Tollens- **mt**
R, S	R ∧ S	Conjunction-**con**
R ∧ S	R, S	Simplification- **sim**
R	R ∨ S	Addition- **add**

Let $P_{i,j}$ be true if there is a pit in [i, j].
Let $B_{i,j}$ be true if there is a breeze in [i, j].
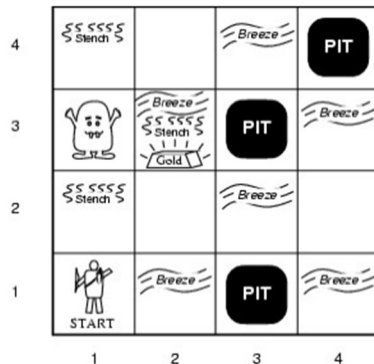
R1: $\neg P_{1,1}$

R2: $\neg B_{1,1} \leftrightarrow P_{1,2} \vee P_{2,1}$

R3: $B_{2,1} \leftrightarrow P_{1,1} \vee P_{2,2} \vee P_{3,1}$

R4: $\neg B_{1,1}$

R5: $B_{2,1}$

Prove that ¬P1,2

3. Given Atomic Propositions are:

$S_{1,2}$ = There is a Stench in cell (1,2)

$B_{3,4}$ = There is a breeze in cell (3,4)

$W_{2,2}$ = Wumpus is in cell (2,2)

$V_{1,1}$ = We have visited cell (1,1)

$OK_{1,1}$=Cell(1,1) is safe

Some rules

(R1) $\neg S_{1,1} \rightarrow \neg W_{1,1} \wedge \neg W_{1,2} \wedge \neg W_{2,1}$

(R2) $\neg S_{2,1} \rightarrow \neg W_{1,1} \wedge \neg W_{2,1} \wedge \neg W_{2,2} \wedge \neg W_{3,1}$

(R3) $\neg S_{1,,2} \rightarrow \neg W_{1,1} \wedge \neg W_{1,2} \wedge \neg W_{2,2} \wedge \neg W_{1,3}$

(R4) $S_{1,,2} \rightarrow W_{1,1} \vee W_{1,2} \vee W_{2,2} \vee W_{1,3}$

Prove that Wumpus is in (1,3)

Content to be written in Observation for output verification:

i. **Solve the problem manually** at the back side of your AI class Note

ii. Date

iii. Ex. No

iv. Title

v. Aim v. Data structure used (with justification)

vi. Logic applied or Algorithm (short description)

vii. Sample input and output