CS3243 : Introduction to Artificial Intelligence

Tutorial 6

NUS School of Computing

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Admin

- Finals next week

Review

- Knowledge Base
- Propositional Logic
- Inferences using what we know
  - Entailment
  - Truth Table Enumeration
  - Inference Algorithm

Tutorial Question 1

- Verify the logical equivalences
- Idea : To use the rules of logic to proceed

Tutorial Question 1(a)

- $\neg(p \vee q) \vee (\neg p \wedge \neg q) \equiv \neg p$

Tutorial Question 1(a)

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- Let's solve the LHS
- $(\neg p \wedge q) \vee (\neg p \wedge \neg q)$
- $\neg p \wedge (q \vee \neg q)$
- $\neg p \wedge \mathbf{true}$
- $\neg p$
- Which is logically equivalent to RHS

Tutorial Question 1(b)

- $(p \wedge \neg(\neg p \vee q)) \vee (p \wedge q) \equiv p$

Tutorial Question 1(b)

- $(p \wedge \neg(\neg p \vee q)) \vee (p \wedge q) \equiv p$

- Let's solve the LHS
- $(p \wedge (p \wedge \neg q)) \vee (p \wedge q)$
- $((p \wedge p) \wedge \neg q) \vee (p \wedge q)$
- $(p \wedge \neg q) \vee (p \wedge q)$
- $p \wedge (\neg q \vee q)$
- $p \wedge \mathbf{true}$
- Which is logically equivalent to RHS

Tutorial Question 2

- Three friends : Alice, Ben, and Cindy
- Constraints given
- Cindy comes to the party only if ALice does not come
- Alice comes to the party if either Ben or Cindy (or both) comes
- Cindy comes to the party if Ben does not come
- Using propositional logic, determine who attends the party

Tutorial Question 2

- Translate the constraints to propositional logic statements (like statements in the Knowledge Base)
- Let's say we define these binary variables
- C: Cindy comes to the party, A: Alice comes to the party, B: Ben comes to the party, and use them to formulate the constraints

Tutorial Question 2

- Translate the constraints to propositional logic statements (like statements in the Knowledge Base)
- Let's say we define these binary variables
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- $C \rightarrow \neg A$
- $(C \vee B) \rightarrow A$ translates to $C \rightarrow A$, $B \rightarrow A$
- $\neg B \rightarrow C$

Tutorial Question 2

- $(C \to \neg A) \wedge (C \to A)$
- $(\neg C \vee \neg A) \wedge (\neg C \vee A)$
- $\neg C \vee (\neg A \wedge A)$
- $\neg C \vee \mathbf{false}$
- $\neg C$
- Cindy ain't coming to the party! Now onto the rest...

Thank you!

If you have any questions, please don't hesitate. Feel free to ask!
We are here to learn together!