Master of Technology in Knowledge Engineering

Unit 1

Intelligent Systems & Techniques for Business Analytics

Exercise & Discussion

— Representation & Reasoning

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Rules of Inference in Propositional Logic

- Example 4.4 (for exercise)
  - » Hypotheses
    - ♦ If you send me an e-mail, then I will finish writing the program ($e \rightarrow p$)
    - ♦ If you do not send me an e-mail, then I will go to sleep early ($\neg e \rightarrow s$)
    - ♦ If I go to sleep early, then I will wake up feeling refreshed ($s \rightarrow r$)
  - » Propositions used
    - ♦ you send me an e-mail, e
    - ♦ I finish writing the program p
    - ♦ I go to sleep early, s
    - ♦ I wake up feeling refreshed, r

Rules of Inference in Propositional Logic (cont.)

Example 4.4 (for exercise) (cont.)

- Conclusion
  - If I do not finish writing the program, then I will wake up feeling refreshed ($\neg p \rightarrow r$)

- How to establish the argument?

Exercise: First Order (Predicate) Logic

- Express the following descriptions using FOL sentences
  - » Any person who is smart buys insurance
  - » Some people invested in stock lost money
  - » Everyone has only one best friend except him/herself

Exercise: who killed Tuna?

- Given the background information below:
  - » Jack loves all animals.
  - » Anyone who loves all animals does not kill an animal.
  - » Either Jack or Curiosity killed the cat, which is named Tuna.
  - » Did Curiosity kill Tuna?
    - ♦ Use the following predicates:
      - Animal(*x*) — *x* is an animal
      - Cat(*x*) — *x* is a cat
      - Loves(*x*, *y*) — *x* loves *y*
      - Kills(*x*, *y*) — *x* kills *y*

Exercise: who killed Tuna? (cont.)

- Use proof by refutation and *linear input resolution* to show that "*Curiosity killed Tuna*".
  - » Express the sentences for related background knowledge, and the goal in first-order logic.
  - » Convert the first-order logic formulas to clausal form.
  - » You are required to show your resolution steps with necessary unification and variable renaming.