CSC486/2502 Test 2

When: Friday December 8

12:10 – 1:00 pm (50 minutes duration)

Please arrive at **noon** so that we can start promptly at 12:10

Where: BA026 (here)

What: Chapters 10-15 inclusive

(i.e., everything after the last test, *excluding* Chapter 16)

Restrictions: Closed book. No aids.

Rough Format: 5-6 questions

- one question with definitions (1-2 lines)
- one question with short answers
- three (+) questions that are shorter to but similar to those we covered in assignments.

Can I post old tests?: Sorry – no I cannot.

Like the assignments, the material is not mine to post.

Review

10. Inheritance
11. Defaults
12. Probability etc.
13. Abductive reasoning
14. Actions
15. Planning

Key Concepts

10. Inheritance

- Inheritance networks
- Strict vs. defeasible inheritance
- Strategies for defeasible inheritance
  - Shortest path heuristic (and its problems!)
  - Inferential distance
- A formal account (following Lynn Stein)
- Support and admissibility
  - Preemption, redundancy
  - Extensions (credulous, preferred)

Key Concepts

11. Defaults (Nonmonotonic Reasoning)

- Generics vs. Universals
- 4 types of nonmonotonic reasoning
- 1) Closed-World Reasoning
  - Closed-World Assumption (CWA)
  - Query Evaluation
  - Consistency of CWA
  - Generalized Closed-World Assumption (GCWA) (weaker
  - Quantifiers & Equality (domain closure, unique names)
- 2) Circumscription
  - Minimal entailment
  - Fixed and variable predicates

Key Concepts (continued)

11. Defaults (Nonmonotonic Reasoning)

- 3) Default Logic
  - Default Rules (normal default rules)
  - Default Extensions
  - Multiple Extensions
  - What to believe? (credulous, skeptical)
- 4) Autoepistemic Logic
  - Stable sets and expansions
  - Enumerating stable expansions

Key Concepts

12. Probability etc.

(Vagueness, Uncertainty and Degrees of Belief)

- Noncategorial reasoning
- 3 ways to make a universal statement less categorical
  1) Strengthen quantifier -- assertion about frequency (statistical interpretation/probabilistic sentences)
  2) Applicability of predicate (vague predicates/flexible membership)
  3) Degree of believe in whole sentence (uncertain knowledge/ subjective probability)
- 1) Objective probability
  - Statistical (frequency) view of sentences
  - Does **not** depend on who is assessing the probability
  - Basic postulates (see the textbook rather than the notes)

Key Concepts

12. Probability etc. (continued)

- 2) Subjective probability
  - Degree of belief derived from statistical considerations
  - Basic Bayesian approach
  - Problem w/ approach (impractical for all but small problems)
  - Solution: exploit structure – Belief/Bayes Nets
  - Bayes Nets: how they work, why they work
  - Dempster-Shafer,
- 3) Vagueness
  - conjunction/disjunction, rules, Bayes reconstruction

Key Concepts

13. Abductive reasoning

(Explanation and Diagnosis)

- Abductive Reasoning
- Diagnosis
- Explanation (adequacy criteria, simplifications)
- Prime Implicates (what they are, how to compute them)
- Computing Explanations
- Abductive Diagnosis
- Consistency-Based Diagnosis
- Beyond the Basics (extensions and other applications)

Key Concepts

14. Actions
    - The Situation Calculus
        - Fluents
        - Preconditions and effect axioms
        - Frame axiom
    - Using the situation calculus
        - Projection task
        - Legality task
        - Planning task (in the next chapter)
    - What is the Frame Problem
    - Solving the Frame Problem
        - Explanation closure axioms
        - Successor state axioms
    - Limitations of Situation Calculus
    - Addressing one limitation: Complex Actions
        - Golog
        - The Do Formula and what it means
        - Using Golog (prolog)

Key Concepts

15. Planning

- Planning in the Situation Calculus
  - Definitions: Goal, Plan, the planning task
  - Using Resolution to generate a plan (how, drawbacks)
- STRIPS Representation
  - Progressive Planning
  - Regressive Planning
- Planning as Reasoning
  - Avoiding Redundant Search
  - Application-Dependent Control (Golog)
- Beyond the Basics
  - Hierarchical Planning (ABSTRIPS)
  - Conditional Planning
  - Reactive Systems
  - You are **not** responsible for SATPLAN, GRAPHPLAN, Model checking and heuristic search planning