School of Computer Science
Coursework Assessment Proforma

Module & Lecturer: CM0312 Artificial Intelligence II, F. C. Langbein

Date Set: 18th March 2010

Submission Date: 12th April 2010

Submission Arrangements:
Hand in your solutions on Monday, 12th of April 2010, 8:30am–9:30am in N2.25.

Title: Artificial Intelligence Coursework II

This coursework is worth 10% of the total marks available for this module. The penalty for late or non-submission is an award of zero marks. You are reminded of the need to comply with Cardiff University's Student Guide to Academic Integrity. Your work should be submitted using the official Coursework Submission Cover sheet.

Learning Outcomes Addressed:

- Understand the operation of monotonic reasoning techniques.
- Compare and contrast the most common models used for structured knowledge representation.

Instructions

Answer each of the attached questions. Answers may be typeset or hand-written. Provide clear justifications for your solutions with all necessary steps.

Criteria for Assessment

Credit will be awarded against the following criteria.

- Approach: are the answers derived from sound, appropriate principles?
- Method: how appropriate is the method for computing the solution?
- Accuracy and consistency: are the computations and solutions correct and consistent with the approach/method?

Further Details

Feedback on your coursework will address the above criteria and will be returned in approximately three weeks. This will be supplemented with oral feedback in lectures and tutorials. If you have any questions relating to your individual solutions talk to the lecturer or the tutor.

CM0312 Coursework II (2009/10)

1. Consider the following first-order logic knowledge base:

   A: $\forall x\ \mathrm{B}(x) \Rightarrow C(x)$

   B: $\forall x\ \mathrm{A}(x) \Rightarrow B(x)$

   C: $\forall x\ \neg\mathrm{A}(x) \Rightarrow B(x)$

   Which first-order logic inference algorithm would you use to prove the following sentence?

   D: C(Constant)

   (Note that you should not provide a proof, but justify why the algorithm should succeed.)

   [2]

2. Consider the following two first-order logic sentences

   A: $\forall x\ A(f(x)) \Rightarrow B(x)$

   B: $\exists y\ \neg A(f(y)) \wedge B(f(y))$

   where A and B are predicates and f is a function. Try to use resolution to prove that A entails B. If a prove exists, state it. Otherwise, explain what goes wrong.

   [6]

3. You wish to prove the sentence α by resolution using a consistent knowledge base KB. Assume converting $KB \wedge \neg\alpha$ into CNF results in a finite set Φ of first order logic clauses. Morevoer, assume that Φ does not contain any function symbols in any of its sentences. In general, for any Φ fulfililng this condition, will resolution terminate by either finding a proof or stating that no proof can be found? Justify your answer. (You may use any result from the available literature to answer this question, but explain it in your own words and obviously cite your source(s)).

   [2]