CMPT 411/721

Knowledge Representation and Reasoning

Autumn 2016
Course Information

Instructor:
Jim Delgrande, T9015; email: jim
Office hours: Tuesday, Thursday 2:00-3:00

TA:
Vahid Vaezian. Email: vvaezian
Office hours: Wednesday and Friday 15:00 – 16:00

Lecture Hours:  MWF 9:30 – 10:20
Lecture Room:  BLU 10021
Course Info

Goal:
Introduction to Knowledge Representation and Reasoning in AI
  • We’ll cover approaches used in KR to represent knowledge for different applications (dealing with e.g. diagnosis, uncertainty, object-centred representations)
  • Also, methods to automate reasoning for these approaches.

Prerequisites:
  • None officially
    • But the course focusses on logical reasoning, so exposure to logic would be good.
  • A course in AI would be good, for familiarity with issues and goals of KRR.
  • *Interest*
Course Grading

Grading

• Marks:
  • 40% - 4 assignments
  • 20% - midterm test;
  • 40% - final exam.

• No project, but some programming

• The final is Saturday, Dec 17, at 12:00
  • You *must* be able to attend the final
  • Note that the final will be 2 hours
Course Grading

Letter Grades
Letter grades will be assigned as follows:

A+: $\geq 90$;   A: 84-89;   A-: 80-83;
B+: 77-79;  B: 74-76;  B-: 70-73;
C+: 67-69;  C: 64-66;  C-: 58-63;
D : 50-57;  F: < 50.

Notes

• Grads and undergrads are treated as distinct cohorts
  • Grads will be asked to do some additional work on assignments.
    🎞️ If you are taking the concurrent B.Sc./M.Sc. program please let me know!
  
• In calculating a final mark, grades will not be scaled down. They might be scaled up, but this is rare.
Course Policies

Coursework and Academic Honesty

• All course work must be done individually by each student.
• It’s ok to discuss general principles and directions for an assignment, but the solutions you submit must be yours i.e., you must have created them entirely on your own.
• Failing to do so will be considered academic dishonesty and appropriate penalties will be applied.
• If you’re in doubt, please ask.
Course Policies

Marking Issues

• For questions concerning the assignments (either for the interpretation of an assignment or for a grade), please see the TA first, and then talk to me if you still have concerns.

• If you have any concerns regarding grading of an assignment or a test, please notify myself or the TA within one week of the material being handed back.
Even More Course Policies

Office Hours and Email

• Please use email only for brief questions or for points of clarification.
• For longer questions or problems please see the TA or myself during office hours.

Due Dates

Unless announced otherwise, all assignments are due at 23:59 on the given date; and late assignments will not be graded.
Text and references

Textbook:

- We’ll be following the text by Ron Brachman and Hector Levesque, *Knowledge Representation and Reasoning* for maybe 60% of the course.
- Slides based on the text are available from the course homepage.
- The book is available for downloading from the Elsevier site.
- Other slides and papers will be made available as needed.
References:
Here are some AI references that may come in handy.

  - The first edition is also pretty good: *Computational Intelligence*, David Poole, Alan Mackworth and Randy Goebel, Oxford University Press, 1998.
- Lots of other references...
Logic references:

- There are numerous good books that introduce logic. Two such books are:
  - *Introduction to Mathematical Logic*, E. Mendelson
  - *A Mathematical Introduction to Logic*, H. Enderton
- Various AI texts have a good introduction to logic.
  - One such text is *Essentials of Artificial Intelligence*, Matt Ginsberg, Morgan Kaufmann, 1993.
Advanced KR books

The following books contain further information on material covered in class, in case you’re interested in learning more.

- *Knowledge in Action*, Raymond Reiter, MIT Press, 2000
Topics

Outline (may be subject to change):

1. Introduction
2. Logic: propositional and first-order. Expressing knowledge
3. Reasoning in logic: resolution
4. Horn clause logic: forward and backward reasoners
5. Description logics
6. Defaults/answer set programming
7. Probabilities (maybe)
8. Argumentation
9. Abductive explanation
10. Reasoning about Action
11. Planning
12. Expressiveness / tractability