

Spring Semester, 1999
Instructor: J. Horty

PHIL 879C, CMSC 721:
Topics in Nonmonotonic Reasoning

Description

The first part of this course will motivate the subject of nonmonotonic reasoning and survey some of the traditional approaches: default logic, autoepistemic logic, the theory of circumscription, and the theory of nonmonotonic inheritance. The second part of the course will be run as a seminar on recent and on-going research in the field. The exact selection of topics here depends on student interest, but may include: attempts at representing priority relations among default rules, general argument systems, theories of belief revision, relations between nonmonotonic and conditional logics, and applications of nonmonotonic logic in the formalization of legal and normative reasoning.

The only prerequisite for the course is a good understanding of classical first order logic; all of the other background material will be taught.

Time and place

Thursdays from 2:00 till 4:30 in Skinner 1116.

Office, phones, etc.

Office: A.V. Williams Building, Rm. 3133. Office phone: x56749. Home phone: 301-585-4586. You are welcome to call me at home, but only between 10am and 9pm, please. Email: horty@umiacs.umd.edu.

Course materials

The text for the course is:

G. Antoniou, *Nonmonotonic Reasoning*, The MIT Press (1997), xii+285 pp.,
available in the bookstore. Other useful collections are

M. Ginsberg (ed.). *Readings in Nonmonotonic Reasoning*. Morgan Kaufmann
(1987), viii+481 pp.,

D. Gabbay, C. Hogger, and J. Robinson (eds.), *Handbook of Logic in Artificial
Intelligence and Logic Programming, Volume 3: Nonmonotonic Reasoning and
Uncertain Reasoning*. Oxford University Press (1994), xviii+529 pp.,

which should be on reserve in the library (I hope).

We'll work through the text, and also look at lots of papers. The official readings for the course will be made available for copying as we get to them; I can also supply some of the background and related material.

Course work

Students who want credit for the course must do three things:

1. Turn in assigned problem sets, which will be nuts and bolts, nothing tricky;
2. Take a midterm exam, which will be take home, open book, and again, nothing tricky;
3. Complete a final project of some kind, which can be either a term paper, an implementation, or even a final, extended problem set—we'll talk about this.

The course will be run as a seminar, and everyone attending, students and auditors, will have to help present the material. These presentations will be frequent but short—no big deal, and good practice.

The grade will be based on a combination of homework, midterm, class presentations, and project. The project is most important, but I'll give a lot of weight to whatever you do best.

Course topics

Here is a tentative list, subject to update. The tentative plan is to work quickly through the topics in Sections A of this list; these are standard things that anyone with a course in the subject should know. After that, we will spend the rest of the term on some (not all) of the topics from Sections B and C, or perhaps others.

A Nonmonotonic reasoning: traditional approaches

1. Default logic.
Text: Chapters 3-7 and 17.
Readings: Reiter [48, Sections 1-3], Reiter and Criscuolo [49].
Background and related material: Delgrande, Schaub, and Jackson [8], Etherington [10, Chapter 3].
2. Autoepistemic logic.
Text: Chapters 9-11.
Readings: Konolige [23], Moore [35], Moore [34].
Background and related material: McDermott and Doyle [33].
3. Circumscription.
Text: Chapter 12.
Readings: McCarthy [31], McCarthy [32], Lifschitz [26].
Background and related material: Etherington [10, Chapters 5–7], Lifschitz [27].
4. Inheritance.
Readings: Horty [17], Horty et al. [22], Touretzky [53, Chapters 1 and 2], Touretzky et al. [54].
Background and related material: Boutilier [3], Etherington [10, Chapter 4], Gelfond and Przymusinska [13], Ginsberg [15], Geffner and Verma [12], Fahlman [11], Horty and Thomason [20], Horty and Thomason [21], Makinson and Schlechta [30], Sandewall [50], Selman and Levesque [51], Stein [52, Chapter 3],

B Nonmonotonic reasoning: abstract approaches

1. Inference relations.
Text: Chapter 13.
Readings: Makinson [28].
Background and related material: Kraus et al. [25].
2. Belief revision.
Text: Chapter 14.
3. Relations.
Text: Chapter 16.

C. Selected topics (tentative).

1. Priorities among defaults.
Text: Chapter 8.
Readings: Brewka [6], Delgrande and Schaub [7].
2. Argument systems.
Readings: Bondarenko et al. [2], Dung [9], Pollock [40], Pollock [41], Pollock [42], Prakken and Sartor [45]. Prakken and Vreeswijk [47].
3. Deontic logic.
Readings: Horty [16], Horty [18], Makinson [29], Prakken [43], van der Torre and Tan [55].
Background and related material: Nute [39], van Fraassen [56].
4. Legal reasoning.
Readings: Horty [19], Kowalski and Toni [24], Prakken and Sartor [44], Prakken and Sartor [46].
Background and related material: Ashley [1], Branting [5].
5. Hierarchies of regulations.
Readings: Morgenstern [36], Morgenstern [37].
Background and related material: Morgenstern and Singh [38].

References

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