MSc Project Proposal, 2012-2013

Implementing Software to Calculate the Rational Closure of a Conditional Knowledge Base

In non-monotonic logic, the *rational closure of a conditional knowledge base* **K** is a construction devised by Lehman and Magidor [1], and subsequently simplified by Paris [3]. Informally, the rational closure $\overline{\mathbf{K}} \supseteq \mathbf{K}$ is the "least prejudiced conditional statements that an agent with knowledge **K** is also willing to accept *a priori*. This has applications in predicting what a rational agent should believe in zero-knowledge situations, given some prior knowledge about what such an agent already believes.

This project will consist of understanding the basic mathematical aspects of the rational closure, and then implementing the algorithm suggested in [3] with a usable interface. Propositional logic and strong programming skills in at least one of Prolog, Haskell or C++ is a necessary prerequisite. Experience in non-monotonic logic (with [3] being a good first course and [2] a slightly more challenging one) is strongly recommended.

This is a challenging project which is appropriate for students likely to obtain a distinction.

Suggested reading: any of the below references. In decreasing order of difficulty:

References

[1] Lehmann, D., and Magidor, M., *What does a conditional knowledge base entail?*, Artificial Intelligence 55 (1992) $1-60$

[2] Kraus, S., Lehmann, D., and Magidor, M., *Nonmonotonic Reasoning, Preferential Models and Cumulative Logics*, Artificial Intelligence 44 (1990) 167 - 207

[3] Paris, J. B., *Nonmonotonic Logic* (lecture notes), 9/2/2012, available from http://www.maths.manchester.ac.uk/~jeff/lecture-notes/math63032NML.pdf, last accessed 4/6/2012