



Offre de stage de Master 2 (3IA ANITI / IRIT)

« Preference compilation for decision-aid systems : transformations and learning »

Decision aid systems, like on-line configurators or recommender systems, need to adapt themselves to each user in order to offer a better interaction and guide the user quickly to the best decision for her: the system should be able to gather a model of the preferences of the user, and be able to show her, almost instantly, during the interaction, what seems to be her best, most preferred possible alternatives. Several models of preferences have been developed in the literature on Artificial Intelligence and Operations Research, offering the possibility to represent complex preferences over multi-attribute domains in some rather compact form. The richness of the models comes at a cost: finding the optimal alternatives is, in general, a computationally hard problem - at least NP-hard - except for some quite restrictive models.

Computationally hard queries are also typical of many logic-based systems. In the last two decades, a new approach, called knowledge compilation has been studied to cope with such hard queries in the context of real-time systems: logical bases can be compiled, off-line, into some less compact representation, which enables fast (polynomial time) query answering. Although, in theory, the size of these less compact representations can grow exponentially fast with the number of variables, this explosion does not often occur in practice.

The topic of this internship is to extend compilation approaches for decision aiding with preferences. There have been some works on properties of real-valued languages for representing preferences, and on some logic-based languages, like penalty logic; and, more recently, for languages based on conditional preference statements. The aim of this internship is to complete the picture. One classical direction of research in knowledge compilation is the comparison of the difficulty of the requests (here, decision aiding requests) which depends on the families of languages considered (generally, the more the language is expressive, the higher the complexity of the requests). But we shall now consider another important properties of these languages : the elicitation of preferences, or how they can be learnt from data, like customer ratings or sales history for on-line decision-aid systems.

We are thus proposing an internship of 4 to 6 months, for candidates in their last year Master II engineering school, interested in hybrid IA. Knowledge in computational complexity theory, machine learning and/or logics would be appreciated

This research takes place within the framework of the "Knowledge Compilation" chair of the Interdisciplinary Institute of Artificial Intelligence Aniti (Artificial and Natural Intelligence Toulouse Institute - ANITI) which has just been launched in Toulouse following the recommendations of the Villani report "AI for humanity".

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