Extensions of frameworks and algorithms for sequential decision making

Résumé du projet de recherche (Langue 1)

The PhD will be granted by the ANR project LARDONS (Learning And Reasoning for Deciding Optimally using Numerical and Symbolic Information). This project addresses the question of decision-making for autonomous agents equipped with knowledge. In most real-world applications, such agents have to face a lot of challenges for taking optimal decisions, that is, deciding what to do depending on the current state of the environment, their beliefs and their goals. In particular, the environment is typically dynamic, uncertain (nondeterministic actions, exogenous events ...), and only partially observable. Moreover, typical real-world environments are described through an extremely large number of attributes, not all of which are relevant for all tasks, and pose real-time constraints on the decision-making process. The PhD will be concerned with factored Markov Decision Processes augmented with constraints and the issues of decision-making and learning for such processes. The theoretical central issue to be addressed will be a study of extensions of the current FMDP/SPUDD frameworks, dealing with multi-valuated variables, compact representations and representations of impossible states and other constraints on the state space and variables, in factored MDPs in order to enhance the classical tasks for such a representation: learning and planning.