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Forthcoming Papers

B. Boutsinas and M.N. Vrahatis, Artificial nonmonotonic neural networks

In this paper, we introduce Artificial Nonmonotonic Neural Networks (ANNNs), a kind of hybrid learning systems that are capable of nonmonotonic reasoning. Nonmonotonic reasoning plays an important role in the development of artificial intelligent systems that try to mimic common sense reasoning, as exhibited by humans. On the other hand, a hybrid learning system provides an explanation capability to trained Neural Networks through acquiring symbolic knowledge of a domain, refining it using a set of classified examples along with Connectionist learning techniques and, finally, extracting comprehensible symbolic information. Artificial Nonmonotonic Neural Networks acquire knowledge represented by a multiple inheritance scheme with exceptions, such as nonmonotonic inheritance networks, and then can extract the refined knowledge in the same scheme. The key idea is to use a special cell operation during training in order to preserve the symbolic meaning of the initial inheritance scheme. Methods for knowledge initialization, knowledge refinement and knowledge extraction are introduced. We, also, prove that these methods address perfectly the constraints imposed by nonmonotonicity. Finally, performance of ANNNs is compared to other well-known hybrid systems, through extensive empirical tests.

B. Bouzy and T. Cazenave, Computer Go: An AI oriented survey

Since the beginning of AI, mind games have been studied as relevant application fields. Nowadays, some programs are better than human players in most classical games. Their results highlight the efficiency of AI methods that are now quite standard. Such methods are very useful to Go programs, but they do not enable a strong Go program to be built. The problems related to Computer Go require new AI problem solving methods. Given the great number of problems and the diversity of possible solutions, Computer Go is an attractive research domain for AI. Prospective methods of programming the game of Go will probably be of interest in other domains as well. The goal of this paper is to present Computer Go by showing the links between existing studies on Computer Go and different AI related domains: evaluation function, heuristic search, machine learning, automatic knowledge generation, mathematical morphology and cognitive science. In addition, this paper describes both the practical aspects of Go programming, such as program optimization, and various theoretical aspects such as combinatorial game theory, mathematical morphology, and Monte-Carlo methods.

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M.B. Do and S. Kambhampati, Planning as constraint satisfaction: Solving the planning graph by compiling it into CSP

The idea of synthesizing bounded length plans by compiling planning problems into a combinatorial substrate, and solving the resulting encodings has become quite popular in recent years. Most work to-date has however concentrated on compilation to satisfiability (SAT) theories and integer linear programming (ILP). In this paper we will show that CSP is a better substrate for the compilation approach, compared to both SAT and ILP. We describe *GP-CSP*, a system that does planning by automatically converting Graphplan's planning graph into a CSP encoding and solving it using standard CSP solvers. Our comprehensive empirical evaluation of *GP-CSP* demonstrates that it is superior to both the Blackbox system, which compiles planning graphs into SAT encodings, and an ILP-based planner in a wide range of planning domains. Our results show that CSP encodings outperform SAT encodings in terms of both space and time requirements in various problems. The space reduction is particularly important as it makes *GP-CSP* less susceptible to the memory blow-up associated with SAT compilation methods. The paper also discusses various techniques in setting up the CSP encodings, planning specific improvements to CSP solvers, and strategies for variable and value selection heuristics for solving the CSP encodings of different types of planning problems.

K. Larson and T. Sandholm, Bargaining with limited computation: Deliberation equilibrium

J.-D. Fouks and L. Signac, The problem of survival from an algorithmic point of view

P.M. Dung and T.C. Son, An argument-based approach to reasoning with specificity

R.I. Brafman and N. Friedman, On decision-theoretic foundations for defaults

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