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Forthcoming Papers

F. Aiolli and A. Sperduti, A re-weighting strategy for improving margins

We present a simple general scheme for improving margins that is inspired on well known margin theory principles. The scheme is based on a sample re-weighting strategy. The very basic idea is in fact to add to the training set new replicas of samples which are not classified with a sufficient margin.

As a study case, we present a new algorithm, namely TVQ, which is an instance of the proposed scheme and involves a tangent distance based 1-NN classifier implementing a sort of quantization of the tangent distance prototypes. The tangent distance models created in this way have shown a significant improvement in generalization power with respect to standard tangent models. Moreover, the obtained models were able to outperform other state of the art algorithms, such as SVM, in an OCR task. © 2002 Published by Elsevier Science B.V.

G. Lamperti and M. Zanella, Diagnosis of discrete-event systems from uncertain temporal observations

Observations play a major role in diagnosis. The nature of an observation varies according to the class of the considered system. In static systems, an observation is the value of a variable at a single time point. In dynamic continuous systems, such a value is observed over a time interval. In discrete-event systems, an observation consists of a sequence of temporally ordered events. In any case, what is observed is assumed not to be ambiguous. This certainty principle, whilst being a useful simplification for a variety of contexts, may become inappropriate for a wide range of real systems, where the communication between the system and the observer is either bound to generate spurious messages, to randomly lose messages, or to lose temporal constraints among them. Consequently, the observation may be underconstrained. To cope with this uncertainty, a number of principles affecting both the observations and the modeled behavior of a system are introduced, that are independent of any specific processing technique. Furthermore, the notion of an uncertain temporal observation for discrete-event systems is introduced and accommodated within a graph whose nodes are labeled by uncertain messages, while edges define a partial temporal ordering among messages. This way, an uncertain observation implicitly defines a finite set of observations in the traditional sense. Thus, solving an uncertain diagnostic problem amounts to solving at one time several traditional diagnostic problems. The notion of an uncertain observation is further generalized to that of a complex observation. Both notions can be exploited by any diagnostic approach pertinent to discrete-event systems. Complex observations are contextualized in the framework of diagnosis of active systems and substantiated by a sample application in the domain of power transmission networks. © 2002 Published by Elsevier Science B.V.

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R. Ben-Eliyahu-Zohary, Yet some more complexity results for default logic

We identify several new tractable subsets and several new intractable simple cases for reasoning in the propositional version of Reiter's default logic. The majority of our findings are related to brave reasoning. By making some intuitive observations, most classes that we identify can be derived quite easily from some subsets of default logic already known in the literature. Some of the subsets we discuss are subclasses of the so-called "extended logic programs". All the tractable subsets presented in this paper can be recognized in linear time.

Z.-H. Zhou, J. Wu and W. Tang, Ensembling neural networks: Many could be better than all

Neural network ensemble is a learning paradigm where many neural networks are jointly used to solve a problem. In this paper, the relationship between the ensemble and its component neural networks is analyzed from the context of both regression and classification, which reveals that it may be better to ensemble *many* instead of *all* of the neural networks at hand. This result is interesting because at present, most approaches ensemble *all* the available neural networks for prediction. Then, in order to show that the appropriate neural networks for composing an ensemble can be effectively selected from a set of available neural networks, an approach named GASEN is presented. GASEN trains a number of neural networks at first. Then it assigns random weights to those networks and employs genetic algorithm to evolve the weights so that they can characterize to some extent the fitness of the neural networks in constituting an ensemble. Finally it selects some neural networks based on the evolved weights to make up the ensemble. A large empirical study shows that, comparing with some popular ensemble approaches such as Bagging and Boosting, GASEN can generate neural network ensembles with far smaller sizes but stronger generalization ability. Furthermore, in order to understand the working mechanism of GASEN, the bias-variance decomposition of the error is provided in this paper, which shows that the success of GASEN may lie in that it can significantly reduce the bias as well as the variance.

J. Cheng, R. Greiner, J. Kelly, D. Bell and W. Liu, Learning Bayesian networks from data: An information-theory based approach

This paper provides algorithms that use an information-theoretic analysis to learn Bayesian network structures from data. Based on our three-phase learning framework, we develop efficient algorithms that can effectively learn Bayesian networks, requiring only polynomial numbers of conditional independence (CI) tests in typical cases. We provide precise conditions that specify when these algorithms are guaranteed to be correct as well as empirical evidence (from real world applications and simulation tests) that demonstrates that these systems work efficiently and reliably in practice.

C. Raphael, A hybrid graphical model for rhythmic parsing

A method is presented for the rhythmic parsing problem: Given a sequence of observed musical note onset times, we simultaneously estimate the corresponding notated rhythm and tempo process. A graphical model is developed that represents the evolution of tempo and rhythm and relates these hidden quantities to an observable performance. The rhythm variables are discrete and the tempo and observation variables are continuous. We show how to compute the globally most likely configuration of the tempo and rhythm variables given an observation of note onset times. Experiments are presented on both MIDI data and a data set derived from an audio signal. A generalization

to computing MAP estimates for arbitrary conditional Gaussian distributions is outlined.

Y. Shoham and S. Toledo, Parallel randomized best-first minimax search

We describe a novel parallel randomized search algorithm for two-player games. The algorithm is a randomized version of Korf and Chickering's best-first search. Randomization both fixes a defect in the original algorithm and introduces significant parallelism. An experimental evaluation demonstrates that the algorithm is efficient (in terms of the number of search-tree vertices that it visits) and highly parallel. On incremental random game trees the algorithm outperforms Alpha-Beta, and speeds up by a up to a factor of 18 (using 35 processors). In comparison, Jamboree [Kuszmaul, J. Internat. Comput. Chess Asoc. 18 (1) (1995) 3–19], speeds up by only a factor of 6. The algorithm outperforms Alpha-Beta in the game of Othello. We have also evaluated the algorithm in a Chess-playing program using the board-evaluation code from an existing Alpha-Beta-based program (Crafty). On a single processor our program is slower than Crafty by about a factor of 7, but with multiple processors it outperforms it: with 64 processors our program is always faster, usually by a factor of 5, sometimes much more.

A. Gerevini and J. Renz, Combining topological and size information for spatial reasoning

Y. Lebbah and O. Lhomme, Accelerating filtering techniques for numeric CSPs

C. Dixon, M. Fisher and A. Bolotov, Clausal resolution in a logic of rational agency

F. Bacchus, X. Chen, P. van Beek and T. Walsh, Binary vs. non-binary constraints

R. Greiner, A.J. Grove and D. Roth, Learning cost-sensitive active classifiers

S. Bistarelli, P. Codognet and F. Rossi, Abstracting soft constraints: Framework, properties, examples

Knowledge Representation and Logic Programming (Special Issue edited by Michael Gelfond and Nicola Leone)

M. Gelfond and N. Leone, Logic programming and knowledge representation—The A-Prolog perspective

V. Lifschitz, Answer set programming and plan generation

G. Gottlob, F. Scarcello and M. Sideri, Fixed-parameter complexity in AI and non-monotonic reasoning

J.J. Alferes, L.M. Pereira, H. Przymusinska and T.C. Przymusinski, LUPS—A language for updating logic programs

B. Cui and T. Swift, Preference logic programs: Fixed point semantics and application to data standardization

V. Marek, I. Pivkina and M. Truszczyński, Annotated revision programs

P. Simons, I. Niemelä and T. Soininen, Extending and implementing the stable model semantics