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# Preface

This special volume contains the revised and expanded version of nine of the 28 papers presented at the Seventh International Workshop on Algorithmic Learning Theory (ALT '96) held in Sydney during October 23–25, 1996. The workshop proceedings appeared as Lecture Notes in Artificial Intelligence, Volume 1160. All the papers included in this volume were subjected to the standard refereeing process of this journal.

The field of algorithmic learning theory covers a number of different areas and the papers selected represent this diversity. Of the nine papers included, one is about the theoretical foundation of genetic programming, four are on concrete learning models, and the remaining four are on various topics in inductive inference.

The paper by Vitányi introduces a novel approach to proving convergence results in genetic programming. He proposes a notion of highly probable fitness optimization through evolutionary runs on small size populations and deploys recent results about rapidly mixing Markov chains to show that under suitable conditions, the proposed method efficiently finds optimal programs with probability almost 1.

The paper by Long addresses the complexity of learning smooth functions on the reals. He derives a nice tight best-possible bound on the worst-case sum of absolute prediction errors in the mistake-bound learning model adapted for continuous-valued functions. Takimoto, Sakai, and Maruoka propose a new kind of decomposition involving exclusive-or expansion based on monotone DNF formulas, and employ it to investigate learnability of DNF formulas in Angluin's query learning model. Arvind and Vinodchandran propose the notion of teaching assistants to develop a more fine-grained version of the exact learning model, and apply this machinery to analyze the complexity of learning permutation groups and linear spaces over finite fields. The paper by Nakamura gives efficient algorithms in the exact learning model for learnability of bounded-width ordered binary decision diagrams when no ordering of the variables is given and learning involves equivalence queries and membership queries.

Of the four papers in inductive inference, two investigate models of learnability and the other two give learnability results for concrete classes. The paper by Case, Jain, and Stephan investigates the impact of noise on vacillatory and behaviorally correct identification in the limit of languages from both texts (positive data only) and informants (positive and negative data). Another recent model is that of learning by erasing. In this model, a machine learns by eliminating potential hypotheses from a space of hypotheses, thereby converging to the least hypothesis never eliminated which is also a solution to the underlying learning problem. This model is extensively

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investigated in the paper by Jain, Kinber, Lange, Wiehagen, and Zeugmann from several different angles. The paper by Shinohara and Arimura surveys the issues involved in learnability of unbounded unions of nonerasing pattern languages — a representation scheme with applications in genome informatics. The authors show that this problem has connections to the learnability of erasing pattern languages from positive data, and derive conditions under which unbounded unions of pattern languages become learnable from positive data. The final paper by Krishna Rao describes a very large class of logic programs that is learnable in the limit from only positive facts. This paper should be of interest to researchers in inductive logic programming.

The editor wishes to thank the members of the program committee of ALT '96 for helping to select the papers for this volume. The editor also wishes to express his sincere gratitude to all the reviewers for their excellent effort. Finally, the help of Setsuo Arikawa and Osamu Watanabe in the preparation of this volume is greatly appreciated.

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