Knihy došlé do redakce/(Books received)

Heinz Unbehauen, Ganti Prasada Rao: Identification of Continuous Systems. (North-Holland Systems and Control Series, Volume 10.) North-Holland, Amsterdam—New York—Oxford—Tokyo 1987. xvi + 378 pages; Dfl. 240,—.

Rolf Isermann: Digital Control Systems. Volume 1: Fundamentals, Deterministic Control. Second, Revised Edition. Springer-Verlag, Berlin—Heidelberg—New York—London—Paris—Tokyo—Hong Kong 1989. xix + 334 pages; 88 figs.; DM 88,—.

Machines, Languages, and Complexity — 5th International Meeting of Young Computer Scientists, Smolenice, Czechoslovakia, November 14—18, 1988, Selected Contributions (*J. Dassow, J. Kelemen, eds.*). (Lecture Notes in Computer Science 381.) Springer-Verlag, Berlin—Heidelberg—New York—London—Paris—Tokyo—Hong Kong 1989. VI + 244 pages; DM 37,50.

A. Boros: Measurement Evaluation. (Revised English version of the Hungarian Mérésértékelés published by Műszaki Könyvkiadó, Budapest 1982.) Akadémiai Kiadó, Budapest 1989. vii + + 220 pages.

A. A. Stognija: Programmnoe obespečenie personalnych EVM — spravočnoe posobie. Naukova dumka, Kiev 1989. 368 stran; 22 obr., 13 tab.; cena 1,70 Rb.

Thomas S. Parker, Leon O. Chua: Practical Numerical Algorithms for Chaotic Systems. Springer-Verlag, Berlin—Heidelberg—New York—London—Paris—Tokyo—Hong Kong 1989. xiv + 354 pages; 152 figs.; DM 98,—.

Louis Trave, Andre Titli, Ahmed M. Tarras: Large Scale Systems: Decentralization, Structure Constraints and Fixed Modes. (Lecture Notes in Control and Information Sciences 120.) Springer-Verlag, Berlin—Heidelberg—New York—London—Paris—Tokyo—Hong Kong 1989. XIV + 354 pages; 40 figs.; DM 87,—.

Dynamical Networks (*Werner Ebeling, Manfred Peschel, eds.*). Akademie-Verlag, Berlin 1989. 222 pages; M 42,—.

J. DASSOW, J. KELEMEN, Eds.

Machines, Languages, and Complexity
5th International Meeting of Young Computer Scientists,
Smolenice, Czechoslovakia, November 14—18, 1988, Selected Contributions

Lecture Notes in Computer Science 381.

Springer-Verlag, Berlin—Heidelberg—New York—London—Paris—Tokyo—Hong Kong 1989.

VI + 244 pages; DM 37,50.

The proceedings contain selected contributions from the scientific programme of the Fifth International Meeting of Young Computer Scientists, held at Smolenice Castle, on November 14—18, 1988. It is nearly impossible to evaluate the scientific level of all papers, therefore in following we shall go in a brief through the whole volume.

The proceedings are divided into five chapters handling with the three fundamental notions of the computer science — machines, languages and complexity. This relatively wide range of topics gives a reader the chance to find here something convenient to his branch of interest. The first chapter contains the contributions on the theory of formal languages. G. Jirásková compares Chomsky hierarchy with the hierarchy of communication complexity for VLSI. The

paper of F. Hinz presents some interesting results concerning context-free and regular picture languages. The lecture of K. J. Lange has an overviewing character and presents important results concerning the connection between formal languages and complexity theory. It is shown that complexity theory serves as an unifying framework integrating many approaches and results which seem to be unrelated at first sight. B. Reichel's paper discusses the descriptional complexity measures depending of number of nonterminals, number of productions and number of symbols of Indian parallel grammars and Indian parallel languages.

The papers dealing with abstract machines are included in the second chapter. Z. Esik presents some completeness theorems concerning the cascade decomposition of automata, using the new aspects of irreducible semigroups. The paper of K. Inoue and I. Takanami surveys several pro-perties of alternating, nondeterministic and deterministic two-dimensional Turing machines, including two-dimensional finite automata, marker automata, and cellular types of two-dimen-sional automata. A. Ito et. al. present a necessary and sufficient condition on space of three-way two-dimensional deterministic (nondeterministic) one-marker automaton, using the number of columns of rectangular input tapes as parameter. The chapter is ended by contribution of A. Slobodová, discussing a relationship of synchronization to alternating machines with only universal states.

The contributions concerning the theory of algorithms are contained in the third chapter. D. Cortolezzis introduces a new structure derived from the grid-file and shows that it allows to perform range queries in an efficient way. The paper of C. Gaibisso presents a partially per-sistent structure which enables an effective solution of an extension of well known Set-Union problem, and moreover, searching in the history of the partition and backtracking over the "union" operations are possible. M. Křivánek's paper attacks the problem of finding the minimum number of bracketing transfers in order to transform one bracketing to another and proves its NP-completeness. Further, some polynomially solvable classes of bracketing problems are derived. M. Loebl and J. Nešetřil consider several variants of the notion of postorder in relation to the Systems Compressions of paths in a tree to the Set-Union problem. Paper of K. Unger deals with a special convex hull problem in two-dimensional Euclidean space and proves the lower time bound of this problem in different models of computation. D. Woods investigates some of the rectangle problems and demonstrates that although rectangles are perhaps the simplest geometrical figures they are a rich source for challenging problems.

Chapter 4 deals with important theoretical problems of artificial intelligence. F. van Harmelen describes the technique of partial evaluation and its application to meta-level interpreters in logic-based expert systems and explores some of the limitations of this technique. The tutorial paper of Klaus P. Jantke provides an introduction into inductive inference, which is a mathematically well based theory of algorithmic learning from possibly incomplete information. It offers some basic motivations of algorithmic learning as well as some fundamental theses about the inter-connections of artificial intelligence and mathematical research work.

The art and science of cryptography is considered in contributions that form the fifth chapter. J. Karri presents a new public key cryptosystem based on propositional calculus and its optimality in certain very strong sense is proven. System encrypts a message in a bitwise manner using probability encryption algorithms. This paper is followed by tutorial paper of Arto Salomaa, which serves the beginner as a guide through the world of cryptography.

Conclusion: Nobody who is interested in recent results in above mentioned branches of computer science should leave out the possibility of going through this volume. High scientific standard and pleasant graphical appearance, usual to volumes of these series, ensure a profit from reading.

Pavel Trska

What is computer algebra? It is not an algebra of special objects, like e.g. matrix algebra is. In words of working definition, quoted in the preface, computer algebra deals with the development, analysis and implementation of algebraic algorithms in many areas of research, including pure and applied mathematics, physics, chemistry, computer science, engineering and economics.

The development of computer algebra, say, in last 15 years, can be attributed to the progress in computer technologies and to new trends in computer software. The main role is played here by CAS — Computer Algebra Systems. They are programming languages, compilers and interpreters equipped with abstract data types and features for algebraic manipulation, e.g. symbolic differentiation, integration, equation solving etc.

The possibility of performing complicated symbolic manipulation by a computer caused a change in the working style in mathematics. A shift to algorithmic solution of problems is apparent, while in the past nonconstructive proofs predominated. The impact of symbolic computing can be seen also in other theoretical branches, e.g. high energy physics, quantum chemistry etc.

The symposium on trends in computer algebra, an interdisciplinary, rapidly expanding area, brought together specialists in the field and scientists from related research areas: mathematicians working in algebra and logic, computer scientists, implementers of software systems and users of them.

The papers can be divided roughly into two groups. The first of them concerns software, computer algebra systems. Jenks (abstract only) distinguishes three generations of CAS: early systems of 60-ies (FORMAC), those developed in 70-ies (REDUCE, MACSYMA) and contemporary ones (SCRATCHPAD).

Jenks, Sutor and Watt give a description of Scratchpad II under development of IBM Research Center. It is a powerful language and interactive system based on data abstractions with strong typing and coercions, combining operations for power series, differentiation, integration, factorization, equation solving etc. It can work as a sophisticated kit for building special purpose libraries. Schwarz gives an example of it: a package for symmetries of partial differential equations. His paper describes an example of software engineering approach to the development of a large software system.

Calmet presents a reasoning about possible future systems. They will be large integrated systems for numeric, symbolic and graphic manipulation. The progress is from formula manipulation to mathematical knowledge manipulation. Connections with knowledge engineering, data bases and artificial intelligence are sketched.

Rump explains the roles of algebraic computation compared with the numeric one. In his paper, also a combination of these approaches is described: computing with guaranteed bounds.

The second group of papers is from various branches of mathematics, influencing or influenced by algebraic computations. Lescanne presents current trends in rewriting techniques, which yield models for computation and provide a basis for computer architectures and software systems.

Buchberger's paper describes basic concepts and results of Gröbner bases theory. This approach in multivariate polynomial ideal theory leads to effective algorithms in computational geometry and kinematics, which are also described.

Paper of Abbott, Bradford and Davenport concerns factorization of polynomials with

integer or algebraic coefficients. While the last word has not yet been said on the subject, many efficient algorithms were developed.

Generalization of fast Fourier transform from cyclic groups to some class of more complicated, nonabelian groups is the subject of Beth's paper. A contribution of algorithmic approach to the research of finite groups and their representation over finite fields was presented by Michler. Matzat's paper concerns the problem of realization of a finite group as a Galois group of a polynomial.

Lüneburg (abstract only) developed an algorithm for computation of Smith normal form of principal ideal domain matrices. Finally, Andrews presents experiences with computer algebra software in the research of hypergeometric functions and combinatorics. The paper shows that such a tool can help in an inspirative way even to a pure mathematician.

The publication can be recommended both to theorists with an interest in the algorithmic approach in their field and to software engineers developing and implementing new languages and systems.

Jan Ježek

RUDOLF HALIN

Graphentheorie

Akademie-Verlag, Berlin 1989.
322 pages; M 79, —.

The Akademie-Verlag Berlin has published the monograph under review in the same year when it was published by the original publisher (Wissenschaftliche Buchgesellschaft Darmstadt). The first edition of the book from 1980/1981 consisted of two volumes and was almost unavailable in socialist countries. Hence many people (both specialists active in graph theory and those only interested in it) will welcome this second edition though most of the readers in Czechoslovakia as well as in other non-German speaking countries would prefer English to German.

The author explains in the foreword that the second edition differs from the first only in a few places (mainly misprints and faults were corrected); an attempt to include into the book the results of the intense development graph theory has undergone in the eighties would mean to write a new book. Accordingly, the comprehensive list of references including 74 textbooks and monographs, 64 proceedings of conferences and more than 400 original papers contains only 12 monographs, 1 proceedings and 10 papers which appeared in 1980 or later. In general, Halin's book may be characterized as a substantial and thoroughly elaborated collection of facts from classical graph theory till the end of the seventies. Mostly undirected graphs are dealt with (not excluding infinite graphs), directed graphs and e.g. hypergraphs are mentioned in brief. The author just presents basic notions of Ramsey's theory; random graphs and complexity are not dealt with. The titles and the extent of the chapters of the book will give a better idea of the contents: 1. Basic notions (15 pages), 2. Representation of graphs (25), 3. Trees and spanning trees (14), 4. Menger's theorem and related problems (20), 5. Existence theorem (29), 6. Chromatic problem (16), 7. Planar graphs (20), 8. Matroids and graphs (43), 9. Groups (15), 10. Simplicial decompositions (42), 11. Higher order connectivity problems (3). An appendix (8 pages) treats 6 different important subjects which could not be incorporated into the main text.

In a thorough style of presentation the author deals with all the themes he had decided to include into the book; at proper places there are various comments and examples, almost every paragraph closes with quite non-trivial exercises. This makes the book an excellent handbook to work with for advanced and graduate students; besides that, Halin's book will be of great use for a long time to anybody working with graphs or interested in them.

Ivan Havel

VAROL AKMAN

Unobstructed Shortest Paths in Polyhedral Environment

The history of mathematics is full of reinventions. Old Greeks knew that the shortest path between two points in plane is a straight line connecting these points. Artificial intelligence and robotics especially must solve similar "shortest path" problems, the formulation of which could arise impression of simplicity, but which in fact are extremely hard. One of the most exciting and significant developments in mathematics of last decades is the emergence of powerful workstations, computers, and from this point of view the possibility of effective computer solution becomes one of the most important and appreciated viewpoints.

The problem solved in monograph under review is a special case of "finding path" problems and can be formulated as follows: Given a set of polyhedra in Euclidean space E_3 and two external points (source and goal), find and calculate the shortest path between these points under the Euclidean metric, constrained to avoid intersections with the interiors of the given polyhedra. This version of problem arise naturally in robotics, while in artificial intelligence, in general, the shortness is not implied and rarely this requirement is in focus of interest. "Finding path" problems on various structures take efforts of many renowned research workers in last years and it should be stated in advance that the monograph of Varol Akman gives an exhaustive overview of recent achieved results, so that it may serve as the reference book as well.

The whole treatise is divided into six chapters. In the introductory chapter some prerequisite material is given, the problem is defined and the relevant work by other researchers is recounted. It is necessary to say that the successful study of further results asks a little bit of special knowledge of algebra and computational geometry and going through these preliminaries doesn't ensure a beginner to comprehend fully the following exposition. Including of this knowledge would surely increase the attractivity of the whole work.

In the second chapter a very inefficient, "brute force" algorithm is given and some ways of speeding it up are discussed. Unfortunately, an efficient, i.e. polynomial-time algorithm for the general case is highly unexpected and it is commonly believed that the problem is NP-hard. This belief is supported also by the fact that there are instances of problem, which contain $O(2^n)$ optimal solutions, n being the number of given polytopes. Currently, there is no algorithm which provably finds the solution in less than $O(n^n)$ steps. It is also shown that the general problem can be solved exactly using symbolic algebra and solution is based upon finding the real roots of a system of nonlinear equations stating the angular equality of edges bending, by classical elimination theory. It is admitted by experts that elimination is very inefficient for solving a system of nonlinear equations, thus, numerical methods may find a good use here.

Chapter 3 treats two special cases of general problem, with only single given polytope. In the fourth chapter the locus approach based on Voronoi-diagrams is presented, using a preprocessing to construct a data structure which will let answer future requests quickly.

Chapter 5 offers an overview of the desirable features of a geometer's workbench and the first attempt to construct the shortest path calculator is presented. Also the functionalities expected from computers equipped with software to perform computational geometry are discussed, Macsyma-system taking as an object of comparison. The monograph is ended by summarization of relevant open research problems and very extensive list of references.

The whole treatise preserves the high scientific standard, usual in the LNCS series, and can be recommended to research workers who want to keep up with recent results in computational geometry.

Pavel Trska

J. CSIRIK, J. DEMETROVICS, F. GÉCSEG, Eds.

Fundamentals of Computation Theory

International Conference FCT'89, Szeged, Hungary, August 21—25, 1989, Proceedings

Lecture Notes in Computer Science 380.
Springer-Verlag, New York— Berlin— Heidelberg— London—Paris—Tokyo—Hong Kong 1989.
xi + 493 pages.

The papers in this volume are the texts of invited adresses and shorter communications present-ed during the seventh International Conference on Fundamentals of Computation Theory held in Szeged, Hungary, on August 21—25, 1989. There are 47 papers in total and their subjects, in general, fall into the following domains: (1) Effective computations by abstract devices, (2) Logics and meaning of programs, (3) Formal languages, and (4) Computational complexity. However, particular papers in the volume are not labelled according to this classification and the reviewer's attempt to do so would be necessarily charged by a great portion of subjectivity, moreover, some of the papers evidently are of interdisciplinary nature. It is why we shall respect the alphabetical order of presentation, seeking for an as short characterization as possible for each contribution.

H. Abdulrab and J.-P. Pécuchet give a survey of major results and algorithms in the field of solving word equations, including the Makanin's algorithm. C. Alvarez, J. Díaz and J. Torán deal with complexity classes with complete problems between P and $NP - C$. Various inter-pretations of synchronous flowchart schemes are presented by M. Bartha. Rather in the form of a conference abstract is the paper by A. Bertoni, D. Bruschi, D. Joseph, M. Sitharam and P. Young on generalized boolean hierarchies and boolean hierarchies over RP. Equational logic of iterative processes is investigated by S. L. Bloom. H. L. Bodlaender, S. Moran, and M. K. Warmuth deal with the distributed bit complexity; this concept attempts to capture the amount of communication required for any useful computation on the network. The jump number problem for biconvex graphs and rectangle covers of rectangular regions is presented and solved by A Brandstädt.

With recent developments in the design of asynchronous circuits deals the surveyal contribution by J. A. Brzozowski and J. C. Ebergen. B. S. Chlebus, K. Diks, T. Hagerup, and T. Radzik present some new results on simulations between certain kinds of PRAMs. Connection between syntactical and computational complexity are studied by J.-L. Coquidé, M. Dauchet, and S. Tison. A formal framework for studying approximation properties of NP optimization is described by P. Crescenzi and A. Panconesi. C. Damm and C. Meinel deal with separating complexity classes related to polynomial size Ω-decision trees. P. Dömösi, E. Ésik, and B. Imreh investigate product hierarchies of automata. The communication complexity of planarity is investigated by P. Ďuriš and P. Pudlák. J. Engelfriet presents some results on context-free NCE graph gram-mars. J. Françon, B. Randrianarimanana and R. Schott describe a combinatorial analysis approach to dynamic data structures with finite population. Iterated deterministic top-down look ahead searching and computation methods are discussed by Z. Fülop and S. Vágvölgyi. D. Geniet and L. Thimonier use generating functions as a toll to compute concurrency.

In a very compressed form of an extended abstract A. Gil-Luezas describes the present state of logics for nondeterministic functional programs. The connections between decision problems and Coxeter groups are discussed by B. Graw. E. Grädel deals with complexity of formula classes in first-order logic with functions. Normal and sinkless Petri nets are the subject of the paper presented by R. R. Howell, L. E. Rosier and Hsu-Chum-Jen. N. Immerman presents a short abstract including the table of known relationships between computational and descriptive com-

plexity classes. The effect of null chains on the complexity of contact schemes is investigated by S. P. Jukna. E. Kinber and T. Zeugmann devote their paper to Monte-Carlo inference and its relations to reliable frequency identification. I. Korec deals with semilinear real-time systolic trellis automata. Some properties of compositions of frontier-to-root tree transformations are presented by T. Kovács.

M. Krause and S. Waack introduce an extended abstract on oblivious branching programs of linear length. Some time-space bounds for one-type deterministic Turing machines are presented by M. Liskiewicz and K. Lorys. I. Litovsky deals with the rank of rational finitely generated w-languages. Extensional properties of sets of time bounded complexity are presented by W. Maass and T. A. Slaman. A. Marchetti-Spaccamela and M. Protasi study the learnability of boolean formulas assuming that the examples satisfy a uniform distribution assumption. The proof theory of default reasoning is investigated by M. A. Nait-Abdalah. The same author present also some considerations concerning the logic programming of some mathematical paradoxes. R. Orlandic and J. L. Pfaltz analyse compact D-complete trees taken as a new access method to large database. Some results on representation of recursively enumerable languages using alternating finite tree recognizers are introduced by K. Salomaa. P. Séébold proves four conjectures concerning some binary morphisms and the factors of the infinite words which these morphisms generate. Some results on the finite degree of ambiguity of finite tree automata are presented by H. Seidl. H. U. Simon deals with approximation algorithms for channel assignment in cellular radio networks.

J. Skurczyński proves that the Borel hierarchy in the class of regular sets of trees is infinite. Parallel general prefix computations with geometric, algebraic and other applications are presented by F. Springsteel and J. Stojmenovič. L. Staiger investigates connections between Kolmogorov complexity and Hausdorff dimension. Tree language problems in pattern recognition theory are briefly reviewed in the extended abstract by M. Steinby. K. Sutner deals with the computational complexity of cellular automata. Restricted boolean circuits are studied by G. Turán and the extended abstract by E. Wanke deals with the complexity of connectivity problems on context-free graph languages. Finally, the last contribution in the volume is that by K. Weihrauch, dealing with constructivity, computability, and computational complexity in analysis.

Some contributions are conceived as extended abstracts, the other ones as full draft papers, their extends vary from 2 to 17 pages. The greatest part of them is of theoretical character, only in two or three cases some more technical applications are mentioned. As far as the level of results and their presentation is concerned, there are also some differences among particular contributions, but in average this level is rather high due to the strict regulation measures taken by the program committee of the conference. From the technical point of view, the volume conserves the traditional high level and covering of Lecture Notes series published by Springer Publishing House.

Ivan Kramosil

GOTTFRIED TINHOFER, GUNTHER SCHMIDT, Eds.

Graph-Theoretic Concepts in Computer Science

**International Workshop WG' 86, Bernried, Federal Republic of Germany,
June 17—19, 1986, Proceedings**

Lecture Notes in Computer Science 246.
Springer-Verlag. Berlin—Heidelberg—New York—London—Paris—Tokyo 1987.
VII + 307 pages; DM 45,—.

The whole volume consists of the contributions to the 12-th International Workshop WG' 86 on Graph Theoretic Concepts in Computer Science, which was held in June 1986 at the Monastery

Bernried near Munich. The proceedings contain 23 invited papers and contributions grouped into 12 thematic groups according to their topics, which include both classic graph theoretic problems, and field of its applications.

When referring a collection of papers like this it is very difficult to evaluate in a brief way the level of each presented paper. It should be stated in advance that all papers can be characterized by a high level of mathematical and formal preciseness. Now let us go through the contents.

N. Korte and R. H. Mohring present a simple algorithm for recognizing interval graphs which works in $(|V| + |E|)$. time. P. Widmeyer discusses some of the most important heuristics of solving the famous Steiner's Problem in graphs and proposes an approximation algorithm which outperforms all of the known heuristics in the quality of solution and time complexity. Paper of M. Kaul concerns structural pattern recognition and presents a graph parser generator that can be adapted to a wide range of applications. A precedence graph grammar is used to describe the structural knowledge about the class of correct patterns. The minimum error distance is computed in $O(n^3)$ time, n the number of nodes of graph, and finally the parse tree of the most similar graph is determined.

M. Jackel describes an abstract interpreter for ADA concurrency abstract. Paper of M. Dao et al. presents results of an interactive aided system for graph representation and manipulation. M. Vogler attacks the hierarchic design of Petri nets by means of "host and daugter" net which preserves the behaviour of the host net. Presented results shed some light on the problem what a homomorphism of Petri nets should be and allow the generation of live Petri nets. U. Faigle considers the ordered bandwith problem for finite tight suborders P of N^2 with $(0, 0) \in P$. The paper of S. Abramowski and H. Müller deals with a searching of connected components in very large grid graphs. An implementation of Warshall's algorithm on a VLSI chip is a topic of R. Devangan's paper. M. Syslo discusses some problems considering outerplanar graphs and outlines many open research problems. This paper is followed by that of M. Wiegers, who presents a linear time algorithm for determining whether an arbitrary graph is outerplanar. I. Gutman's paper deals with molecular graphs, i.e. graphs which represent chemical structures. A number of graph polynomials are pointed out and some properties are discussed.

Applications of parallel scheduling to perfect graphs is considered in the paper of D. Helmbold and E. Mayr. A Schoone et al. consider a problem of determining the maximum diameter of the graph obtained by deleting k edges from a graph, assuming that the resulting graph is still connected. R. Tamassia and I. G. Tollis present a complete characterization of the class of graphs that admit the so-called cylindrical visibility representation. P. Spirakis considers the problem of probability distribution of the maximum of the diameters of the connected components of random graph. G. di Battista presents an algorithm for k-line planarity testing of hierarchical graphs.

For a practical reason it is impossible to mention all the presented papers although the selection was made with intention to cover the main results presented in this proceedings.

The volume conserves the high level of the Publishing House in general and LNCS in particular, although more care devoted to more uniform graphical presentation would be appreciated. Conclusion: Everyone who is interested in application of the graph theory will find here highly interesting results.

<div align="right">*Pavel Trska*</div>

K. MORIK, Ed.

Knowledge Representation and Organization in Machine Learning

Lecture Notes in Artificial Intelligence, subseries of Lecture Notes in Computer Science. Springer-Verlag, Berlin—Heidelberg—New York—London—Paris—Tokyo—Hong Kong 1989. Strán XIII + 319; cena 65,— DM.

Publikácia predstavuje sériu 15 príspevkov zo zasadania "Workshop on Knowledge Represen-

tation and Organization in Machine Learning" v Schloss Eringerfelde r. 1987. Je zameraná na jednu oblasť výskumu v umelej inteligencii — na strojové učenie (Machine Learning).

Pojem strojové učenie (Machine Learning) sa začal kryštalizovať v súvislosti s výskumom o inteligentnom správaní sa strojov. Už Turing v r. 1959 hovoril o strojovom učení ako o riešení problémov prostredníctvom istých problémov za účelom vyriešiť nový problém. V súčasnosti sa strojové učenie chápe ako proces, v ktorom sa vytvára a obnovuje reprezentácia tej časti systému, ktorá je v interakcii s prostredím (Scott 1983, všeobecnejšiu definíciu podal Michalski r. 1986). Preto sa do popredia záujmu v umelej inteligencii dostali poznatkovo orientované systémy a získavanie a reprezentácia poznatkov pre takéto systémy.

Po rokoch od prvého medzinárodného pracovného stretnutia v Carnegie-Mellon University r. 1980 sa výskum v tejto oblasti špecializoval dvomi smermi: učenie z príkladov a učenie na základe pozorovania. Oba tieto smery sú tématicky orientované na reprezentáciu poznatkov pri strojovom učení. Táto kniha preto obsahuje príspevky o reprezentácii poznatkov a ich získavaní pri strojovom učení. V príspevkoch sa diskutujú ich rozličné aspekty.

W. Swartout a S. Smoliar opisujú expertný systém s formalizmom na vytváranie reprezentačného jazyka. W. Velde prezentuje dvojúrovňový expertný systém, ktorý transformuje príčinné vzťahy do iných pravidiel, ktoré sú vhodnejšie na rýchlejšie riešenie problému. M. Mohnhaupt a B. Neumann opisujú vizuálny systém do ktorého transformovali veľký počet príkladov za účelom učenia sa analógiou. Transformáciou reprezentácií v rozličných databázových systémoch do jedného systému sa zaoberá R. Rada a H. Mili. D. Littman si bližšie všíma poznatkových inžinierov v samotnom poznávacom procese, v ktorom vytvárajú reprezentácie poznatkov. K. Morik uvádza chronologický prehľad problematiky získavania poznatkov vo vzťahu k učeniu. V systéme DISCIPLE od Y. Kodratoffa a G. Tecuci sa používajú rôzne techniky strojového učenia (učenie na základe podobnosti, učenie na základe vysvetľovania, učenie analógiou). W. Emde diskutuje o všeobecných požiadavkách pre formalizmy na reprezentáciu poznatkov v učiacich sa systémoch. Prezentuje inferenčný stroj IM-2. S. Thieme diskutuje o poznatkoch, potrebných pre algoritmus strojového učenia. S algoritmami učenia sa zaoberá aj M. Someren. M. Manago a J. Blythe rozšírili metódu Mitchella. Ch. Vrain a Y. Kodratoff skúmajú učenie sa analógiou s rešpektom na riešenie problémov. D. Wilkons a M. Pazzani opisujú dva typy učenia na základe vysvetľovania. S. Wrobel aplikuje model učenia určený pravidlami.

Všetky príspevky skúmajú príslušné algoritmy učenia a tiež prispievajú k riešeniu problému získavania poznatkov, ktorý je problémom reprezentácie danej problémovej oblasti. Cieľom strojového učenia je vytvoriť reprezentáciu faktov, poznatkov a úloh pre túto oblasť.

Problémy reprezentácie boli konfrontované z rôznych pohľadov:

— formalizmus reprezentácie musí byť adekvátny získavaniu poznatkov a strojovému učeniu (Emde, Swartout, Smoliar)
— jazyky reprezentácie musia byť adekvátne strojovému učeniu (Manago, Someren, Pazzani, Wrobel)
— reprezentácia poznatkov z danej oblasti je komplexný proces vtedy, ak je určený jazyk a formalizmus reprezentácie (Morik, Kodratoff, Tecuci, Littman).

Kniha môže byť vhodná pre výskumníkov zaoberajúcich sa reprezentáciou poznatkov a ich aplikáciou v poznatkovo orientovaných systémoch, získavaním poznatkov a strojovým učením. Taktiež je vhodná pre učiteľov a študentov zaoberajúcich sa umelou inteligenciou ako aj pre pracovníkov, ktorí vytvárajú expertné systémy a zaujímajú sa o nové metódy získavania a uchovávania poznatkov.

Jana Parízková

JAMES MARTIN, STEVEN OXMAN

Building Expert Systems: A Tutorial

Prentice Hall, Englewood Cliffs, New Jersey 1988.
Strán XIII + 457, obrázkov 137; cena 96,— DM.

Publikácia zoznamuje čitateľov s problematikou expertných systémov veľmi prístupným spôsobom a poskytuje základné informácie o prostriedkoch pre tvorbu expertných systémov.

Autori začínajú definíciou expertných systémov a zaoberajú sa súčasnými i budúcimi technológiami tvorby expertných systémov. Ďalej opisujú spôsoby určenia úloh, ktorých riešenie je vhodné podporiť technológiou expertných systémov. Okrem toho sa čitateľ dozvie o výbere správneho expertného systému na riešenie niektorých problémov.

Text je písaný prehľadne a zrozumiteľne s množstvom obrázkov. Jasne sú definované dôležité pojmy a sú uvedené príklady expertných systémov. Spracovanie knihy zodpovedá dlhoročným autorovým skúsenostiam v oblasti výpočtovej techniky, ktoré boli zúročené v publikačnej činnosti (J. Martin doteraz uverejnil viac ako 30 kníh).

Kniha je rozdelená do 4 častí: Why Expert Systems, The Construction of Expert Systems, Tools for Building Expert Systems, Construction Strategies. Úvod obsahuje slovník používaných pojmov týkajúcich sa umelej inteligencie a expertných systémov.

Čo sú expertné systémy? Akými sa stanú expertné systémy v budúcnosti? Aké obchodné záujmy budú ovplyvňovať expertné systémy? Ktorá doba bude vhodná pre použitie expertných systémov? Na tieto otázky odpovedá prvá časť knihy, pričom sa vychádza z predpokladu, že čitateľ nemá obzvlášť veľké znalosti o expertných systémoch resp. o umelej inteligencii.

Druhá časť knihy už obracia pozornosť na stavbu expertných systémov. Skúma sa návrh a architektúra, hovorí sa o životnom cykle expertných systémov. Autori pomáhajú čitateľovi určiť, či riešenie istej úlohy je vhodné podporiť expertným systémom.

V tretej časti sa uvádzajú prostriedky, potrebné na zostrojenie expertného systému. Myslia sa tým programovacie jazyky LISP, PROLOG, OPS 5 a prázdne expertné systémy (napr. EXSYS, INSIGHT 2 +, KEE, PICON, RULEMASTER, TIMM). Táto časť knihy sa venuje aj diskusii o výpočtovej technike, špeciálne navrhnutej pre programové vybavenie z oblasti umelej inteligencie.

Štvrtá časť prezentuje stratégie tvorby expertných systémov, (XSEL), ale aj systémov pre osobné počítače. Autori vedú čitateľa k správnemu výberu prostriedkov na vytvorenie expertného systému. V závere tejto časti knihy sa hovorí o technológii expertných systémov v budúcnosti.

Kniha je veľmi dobrým sprievodcom pre študentov, ktorých uvádza učebnicovým spôsobom do oblasti expertných systémov. Publikácia môže pomôcť aj expertom v objasnení otázok čo sú expertné systémy, aké majú vlastnosti a ako môžu experti tieto systémy použiť.

Jana Paŕízková

JOSEF KOVÁČ, JOSEF LORD

Databázový systém s IDMS

Alfa — Vydavateľstvo technickej a ekonomickej literatúry Bratislava 1989.
Strán 400; 112 obrázků, 18 tabulek; cena 33,— Kčs.

Kniha vyšlá v červnu 1989 byla uvítána jako velmi konkrétní příspěvek na československém knižním trhu, který doposud věnoval databázovým systémům a jejich projekci jen obecně zaměřené publikace[1], [2], [3]. Zkušení uživatelé multilicence softwarových produktů IDMS, kterou

[1] D. C. Tsichritzis, F. H. Lochovsky: Databázové systémy. SNTL, Praha 1987.
[2] A. Scheber: Databázové systémy. Alfa, Bratislava 1989.
[3] J. Gregor, V. Chvalovský: Projektování datové základny. SNTL, Praha 1988.

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u nás již po léta podporuje Datasystém Bratislava, ale i dalších více či méně kompatibilních systémů, tak získávají zdroj řady užitečných nápadů a zkušeností. Nezkušení uživatelé a studující zabývající se databázovými systémy (např. na oborech Informatika, ASŘ apod.) pak mohou knihu použít jako učebnici, resp. jako doplněk obecné literatury. Oba autoři jsou odborné veřejnosti známi jako dlouholetí pionýři jedné z prvních větších instalací IDMS v Československu, z řady odborných příspěvků i jako autoři aktualizačního systému, který je využíván i v dalších instalacích databázového systému IDMS.

Kniha vychází kromě nezbytného úvodu do databázové problematiky a všeobecné charakteristiky softwarových produktů IDMS z popisu programovacích jazyků IDMS/DB, tj. jazyka pro popis dat DDL a jazyka pro manipulaci s daty DML. Na něj pak navazuje jádro knihy týkající se vytváření databázového systému, plné návodů, příkladů a dobrých rad.

V části věnované navrhování struktury databáze jsou popsány možnosti tvorby logické a fyzické struktury a jeden z možných postupů. Je třeba ocenit zejména část věnovanou návrhu fyzické struktury, rozpracovanou do téměř algoritmické podoby. Pro praxi však budou pravděpodobně ještě cennější další kapitoly věnované programování algoritmů, vytváření provozu databázového systému a práci jeho správy. Mnohé z uvedených problémů totiž bývají v literatuře obvykle opomíjeny nebo méně rozpracovány. Jsou uvedeny vzorové postupy, programové konstrukce i moduly. Pokud mohu posoudit, jde vesměs o následováníhodné příklady. Poslední kapitoly se věnují produktům těsně svázaným s databázovým systémem — Integrovanému slovníku dat IDD, generátoru sestav IDMS/CULPRIT, transakčnímu monitoru IDMS/DC a dotazovacímu jazyku IDJ — a samozřejmě v duchu celé knihy opět především návodům na jejich efektivní použití.

Přestože se mi kniha velmi líbí, nemohu nevytknout dvě věci: 1. Vydání této publikace bylo žádoucí již před několika lety, v době, kdy se desítky našich velkých výpočetních středisek doslova prokousávaly horou literatury, testovaly úskalí centralizovaného sdíleného provozu, aktualizace, žurnálování a hledaly efektivní fyzické struktury. Tehdy by bylo vydání knihy podporou pionýrského úsilí pracovníků Datasystému i obou autorů. Dnes již ve světě éra IDMS jako databázového systému z nejrozšířenějších pomalu končí, i když některé instalace IDMS budou jistě „žít" ještě léta (bez ohledu na zánik firmy Cullinet v 1. polovině loňského roku). Rovněž u nás se růst počtu instalací IDMS zpomaluje. Připomeneme-li si, že zakoupení multilicence IDMS se událo před deseti lety, nahlédneme-li do starších sborníků Datasystému či vysokoškolských skript, je časové zpoždění vydání knihy obžalobou nepružné a nekomplexní politiky nejen vydavatelské, ale i investiční. 2. Autorům se nepodařilo vyhnout některým nepřesnostem při zasazení specializovaného obsahu knihy do širšího kontextu, tj. konkrétně spojení projektování IDMS databází s obecnější problematikou projektování datové základny organizace (zahrnuje i data mimo databázi nebo pracuje s různými databázemi apod.) resp. s projektováním informatizace vůbec. Tak např. nelze jistě tvrdit s obrázkem 1.4, že projektování ASŘ = navrhování struktury databáze + programování apod.

Uvedení okrajových připomínek jen podtrhuje, že meritorní látka je zpracována ve vysoké kvalitě. Autoři prokázali nejen svou způsobilost odbornou, ale i pedagogickou. Látka je srozumitelná a schemata i příklady ilustrují. Čtenářům tak téměř nezbývá nic jiného, než vyrazit na cestu aplikace získaných zkušeností.

Jiří Gregor