
BOOK REVIEW

Annual Review of Computer Science, vol. 3, 1988, pp. 420, (eds.) J. F. Traub, (Published by Annual Reviews Inc., 4139 El Camino Way, Palo Alto, CA 94303, USA), Price: US\$ 45, elsewhere \$ 49.

In this volume there are 13 interesting articles surveying or summarizing the recent advances in several areas of computer science. The fields of artificial intelligence and computer science theory claim four articles each. Three articles are devoted to software science and two articles are devoted to special topics.

A successful application of AI techniques is in the development of expert systems software. In the review 'Fundamentals of expert systems' the authors discuss the characteristics of expert systems and their dependence on the extent of the knowledge and database of specific problem areas. The article 'Image analysis' deals with the problem of defining the relationship between a real object and its two-dimensional digitized image on the screen. The related algorithmic techniques are reviewed. In the article 'Resolution theorem proving', the methods of automated deduction are applied to propositional calculus and equality reasoning. In the review 'Commonsense physics' the author describes the new subfield of AI called qualitative physics. This is concerned with modelling expert reasoning as well as common sense and also with uncovering the ties between qualitative and traditional models of physics.

Of the four articles on computer science theory, 'Parallel algorithmic techniques for combinatorial computation' is of interest to those dealing with software development for parallel processors sharing a common memory. The recent algebraic approaches to algorithmic solutions of geometric reasoning problems are surveyed in 'Algebraic methods for geometric reasoning'. Another related article, 'Computational geometry', reviews some of the foundations of the subject—convex hulls, Voronoi

diagrams and arrangements. Its author also discusses some of the exciting developments in this area discovered by Guibas *et al.* The computational cost of solving problems with an algebraic flavour is the subject of the review 'Algebraic complexity theory'. In it the effect of well-designed algorithms on the upper bound of complexity and the effect of intrinsic properties of problems on the lower bounds of complexity are nicely discussed in a question-answer format.

Among the three articles on software science, the most interesting is a review of the Lisp language. In it the power, simplicity and vitality of Lisp, responsible for its continuing popularity, are discussed. The second article discusses the development, during the past 25 years, of specific principles for reasoning about the correctness of programs for solving specific problems. Attention is given to deterministic sequential programs and their logical foundations. The third article discusses techniques of ensuring the secrecy, integrity and accessibility of data stored in a database.

One of the two special articles in this volume is on computational approaches to an exponential-time problem in protein folding. The problem of spontaneous folding of protein molecules into unique three-dimensional structures is well explained for computer scientists. The tremendous progress made since G. N. Ramachandran *et al.* (1963) pioneered the first conformational energy estimates on dipeptides is also reviewed. Finally there is a review on the importance of product design, process design, facilities design and activity planning in industrial manufacturing based on computers.

To sum up, this volume must find a place in computer science libraries everywhere.

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