# **Cambridge Books: The Logical Choice**

### Randomized Algorithms Rajeev Motwani and Prabhakar Raghavan

"This book will surely exert a powerful influence on the way algorithm design is practiced and taught."

----Richard M. Karp 1995 490 pp. 47465-5 Hardback \$39.95

### Real-Time Computer Vision Christopher M. Brown and Demetri Terzopoulos, Editors

The first book devoted to this rapidly developing and highly interdisciplinary field of computer science and engineering. *Publications of the Newton Institute 4* 1995 248 pp. 47278-4 Hardback

## **Movement Control**

### Paul Cordo and Stevan Harnad, Editors

"... the choice of topics is interesting and attractive; and the commentaries provide a multifaceted perspective."

—Michael Arbib, Center for Neural Engineering, University of Southern California, Los Angeles 1994 288 pp. 45241-4 Hardback \$85.00

 			\$00.00
	45607-X	Paperback	\$27.95

### Functional Programming and Input/Output Andrew D. Gordon

## Anarew D. Goraon

Shows how a theory of functional programming can be smoothly extended to admit both an operational semantics for functional I/O and verification of programs engaged in I/O.

*Distinguished Dissertations in Computer Science 8* 1995 170 pp. 47103-6 Hardback \$39.95

## The MUSE Method for Usability Engineering

### Kee Yong Lim and John Long

Reviews the motivation for developing MUSE, and provides readers with a manual for applying the method. *Cambridge Series in Human-Computer Interaction 8* 1995 349 pp. 47494-9 Hardback \$49.95

## Computational Geometry in C Joseph O'Rourke

"…ver diffici	ry clearly writ ult-to-explain	ten and man topics such a	ages to make to s point-line du	raditionally ality very
under	standable…"	Sco	t Drysdale, SI	GACT News
1994	327 pp.	44034-3	Hardback	\$59.95
		44592-2	Paperback	\$24.95

Available in bookstores or from





\$49.95

### The Uncertain Reasoner's Companion

A Mathematical Perspective

### J.B. Paris

Presents the key results on the subject, concentrating on giving clear mathematical formulations, analyses, justifications, and consequences of the main theories. *Cambridge Tracts in Theoretical Computer Science 39* 

1995 222 pp. 46089-1 Hardback \$39.95

## Affine Analysis of Image Sequences

Larry S. Shapiro

Presents a new computer vision framework

for interpreting time-varying imagery. *Distinguished Dissertations in Computer Science 10* 1995 c.200 pp. 55063-7 Hardback \$49.95

### The Foundations of Parallel Computing David Skillicorn

Provides an accessible account of the latest techniques usedto design architecture independent parallel software.Cambridge International Series on Parallel Computation 71995209 pp.45511-1Hardback\$39.95

## Introduction to Distributed Algorithms Gerard Tel

Clear yet rigorous introduction to a large collection of methods and related theory largely developed over the last 15 years.

Cambridge International Series on Parallel Computation 61995544 pp.47069-2Hardback\$49.95

## **Information Systems Engineering**

## A Formal Approach

Kees M. van Hee "...an excellent resource." — Choice

1994 434 pp. 45514-6 Hardback \$44.95

## Now in paperback ...

## Logic and Information Keith Devlin

"Mathematically oriented readers interested in artificial intelligence and human cognition should be able to get new ideas from this well-written book."

-P. Jouvelot, Computing Reviews

49971-2 Paperback \$19.95	1991	320 pp.	41030-4	Hardback	\$39.95
			49971-2	Paperback	\$19.95

40 West 20th Street, N.Y., NY 10011-4211 Call toll-free 800-872-7423 Web site: http://www.cup.org MasterCard/VISA accepted. Prices subject to change.



## **INSTRUCTIONS FOR AUTHORS**

#### AIMS AND SCOPE

AIEDAM: Artificial Intelligence for Engineering Design, Analysis and Manufacturing is an archival research journal that is intended to reach two audiences: engineers and designers who see AI technologies as powerful means for solving difficult engineering problems; and researchers in AI and computer science who are interested in applications of AI and in the theoretical issues that arise from such applications. The Editor is specifically seeking original articles that develop new and interesting applications based on the most up-to-date research in all branches and phases of engineering, including analysis, synthesis and design; manufacturing and assembly; and concurrent engineering. The journal is interested in the use of AI in planning, design, analysis, simulation, spatial reasoning and graphics, manufacturing, assembly, process planning, scheduling, numerical analysis, and optimization. Areas of special interest include: knowledge-based (expert) systems for engineering, including knowledge acquisition and representation, control, and system architectures; theoretical work on the modeling of engineering problem-solving and design processes; the integration of AI-based techniques with numerical analysis tools, graphics and solid modeling packages, and engineering databases; and engineering applications of knowledge-based vision and of natural language processing.

### **ORIGINALITY AND COPYRIGHT**

To be considered for publication in AIEDAM a manuscript cannot have been published previously, nor can it be under review for publication elsewhere. Papers with multiple authors are reviewed with the assumption that all authors have approved the submitted manuscript and concur in its submission to AIEDAM. A Transfer of Copyright Agreement must be executed before an article can be published. Government authors whose articles were created in the course of their employment must so certify in lieu of copyright transfer. Authors are responsible for obtaining written permission from the copyright owners to reprint any previously published material included in their article.

### MANUSCRIPT SUBMISSION AND REVIEW

Three high quality copies of articles, in English, should be submitted to the Editor.

Professor Clive L. Dym, Editor AIEDAM Department of Engineering Harvey Mudd College Claremont, CA 91711 Phone: (909) 621-8853 Fax: (909) 621-8967 E-mail: Clive\_Dym@hmc.edu

Photocopies of typescripts will not be accepted for publication. For refereeing purposes only, good photocopies may be submitted. Upon acceptance of the manuscript the top copy and the original illustrations should be submitted for publication. Authors of accepted manuscripts are urged to submit their final manuscripts on diskette as well as on hard copy, dentifying what software was used.

### MANUSCRIPT PREPARATION AND STYLE

Paper should be typed in double spacing throughout, including tables, footnotes, references and legends to tables and figares. One side of the paper, only, should be used and there should be a margin of at least 2.5 cm all around. The position of tables and figures should be clearly indicated, in sequence, n the text. Tables, footnotes and legends to figures should be yped separately. Where it is essential for clear crosseferencing, particularly in mathematically-orientated mateial, paragraphs and subparagraphs may be numbered, and he decimal system should be used, i.e. 1.1.1., 1.1.2., etc. A

short running title of not more than 40 characters (including spaces) should be indicated if the full title is longer than this. The name of the laboratory where the work has been carried out should be indicated on the title page and the full postal address for the despatch of proofs and offprints should be included on a separate page. Minor corrections to the manuscript may be typed or neatly printed in ink; retyping is required for significant changes. Numbers should be spelled out when they occur at the beginning of a sentence; use Arabic numerals elsewhere.

#### MANUSCRIPT ELEMENTS AND ORDER

Unless there are obvious and compelling reasons for variation (e.g. review articles, short communications), manuscripts should be organized as follows:

Title page. This is page 1. The title should be concise, informative, and free of abbreviations, chemical formulae, technical jargon, and esoteric terms. This page should include (a) the article's full title, (b) names and affiliations of all authors. (c) the name, mailing address, and telephone number of the corresponding author, (d) the address for reprint requests if different from that of the corresponding author, (e) a short title of 50 characters or less, and (f) a list of the number of manuscript pages, number of tables, and number of figures.

Abstract and keywords page. This is page 2 and should include (a) the article's full title, (b) an abstract of no more than 300 words, and (c) up to 5 keywords or phrases that reflect the content and major thrust of the article. The abstract should give a succinct account of the objective, methods, results, and significance of the subject matter.

Introduction. This section begins on page 3 and should clearly state the objective of the research in the context of previous work bearing directly on the subject. An extensive review of the literature is not usually appropriate.

Citations in text. Customary abbreviations will be accepted and the authors are recommended to employ Système Internationale (SI/metric) units. Special and unusual symbols should be clearly identified, especially if handwritten. Spell out acronyms at first use, but use only acronyms thereafter. All equipment supplies and products stated in the article should have the manufacturer name and location identified at first mention.

Tables. Tables should be numbered consecutively with Arabic numerals and each should be typed double-spaced on a separate sheet. All tables are to be grouped together after the references. A short explanatory title and column headings should make the table intelligible without reference to the text. All tables must be cited and their approximate positions indicated in the text.

Figures and legends. The number of figures should be the minimum necessary to make the essential points of the paper. Figures should be supplied no larger than  $8 \times 10^{"}$  (approx.  $200 \times 250$  mm) and must be camera-ready. Photographs will be accepted only if the information cannot be presented easily in any other form. Explanation and keys should, as far as possible, be placed in the legends. Photographs for halftone reproduction must be on white glossy paper. Figures should be composed to occupy a single column (8.3 cm) or two columns (17 cm) after reduction. Diagrams and illustrations must have a professional appearance and be typed or drawn with sharp, black lettering to permit reduction. To assure legibility, letters, numbers, and symbols on figures should have a minimum height of 1 mm when reduced.

Artwork should normally be in black and white; if authors have color figures, the publisher will provide a price quotation for the additional production costs. All figures must be identified on the back with the short title of the paper, figure number, and figure orientation (top or bottom). Preferably, figures should be mounted on heavy sheets of the same size as the manuscript. Four complete sets of figures should be carefully packaged in protective envelopes, one to accompany each copy of the manuscript. Each figure must be cited and its approximate position clearly indicted within the text.

Figures must be numbered consecutively with Arabic numerals and be accompanied by a descriptive caption typed double-spaced on a separate sheet. The captions, collected at the end of the manuscript, should concisely describe the figure and identify any symbols and/or calibration bars.

References. Entries should be listed alphabetically by lead author at the end of the paper. All authors' names should be included, followed by the year of publication, the full title of the journal, volume, issue number, and inclusive page numbers. For books, the full title should be given, followed by the editors, volume number (if any), page numbers, publisher and place of publication. Citations in the text should read: Brown and Smith (1973), but (Brown & Smith, 1973). Where there are more than two authors the citation should read: Brown et al. (1973). The conventional Brown (1973a), Brown (1973b) should be used where more than one paper by the author(s) has appeared in the same year. Brief examples:

#### Journal or Magazine article

Schank, R.C. (1991). Where's the Al? AI Magazine 12(4), 38-49

Segre, M.A. (1991). Learning how to plan. Robotics and Autonomous Syst. 8(1-2), 93-111.

#### Book

Dym, C.L. (1994). Engineering design: A synthesis of views. Cambridge University Press, New York.

#### Chapter in an edited book

Quinlan, J.R. (1983). Learning efficient classification procedures and their application to chess end games. In Machine Learning: An Artificial Intelligence Approach, (Carbonell, J.G., et al., Eds.), Vol. 1, pp. 463-482. Morgan Kaufmann, Los Altos, California.

#### Proceedings

Craw, S., & Sleeman, D. (1990). Automating the refinement of knowledge based systems. Proc. Ninth Europ. AI Conf., 167-172.

#### Proceedings with publisher identified

Mittal, S., & Frayman, F. (1989). Towards a generic model of configuration tasks. Proc. Eleventh Int. Joint Conf. Artificial Intelligence, pp. 1395-1401. Morgan Kaufmann, Los Altos, California.

The alphabetical list of references begins a new page, and must be typed double-spaced. Each in-text citation must have a corresponding reference and vice versa. List works by different authors who are cited within the same parentheses in chronological order, beginning with the earlier work. Journal titles should not be abbreviated. Only published articles and articles in press should appear in this list. Responsibility for the accuracy of references cited lies with the authors.

Author biographies. Brief author biographies will be printed at the end of each paper; they should not exceed 100 words for each author.

#### **COPYEDITING AND PAGE PROOFS**

The publisher reserves the right to copyedit manuscripts to conform to the style of AIEDAM. The corresponding author will receive page proofs for final proofreading. No rewriting of the final accepted manuscript is permitted at the proof stage, and substantial changes may be charged to the authors.

#### **OFFPRINTS**

The corresponding author will receive 50 free article offprints. A form will accompany the page proofs allowing orders for complete copies of the issue and for the purchase of additional offprints. Offprint requirements of all coauthors should be included on this form. Orders received after issue printing will be subject to a 50% reprint surcharge.

JOHN S. GERO Improving Design Problem Formulations Using Machine Learning	147
DAN L. GRECU AND DAVID C. BROWN Design Agents That Learn	1 <b>49</b>
S. PRABHAKAR AND ASHOK K. GOEL Learning about Novel Operating Environments: Designing by Adaptive Modelling	151
PIETRO LEO, DEREK SLEEMAN, AND AUGOUSTOS TSINAKOS S-SALT: A Problem Solver, Knowledge Acquisition Tool and Associated Knowledge Base Refinement Mechanisms	157
MARY LOU MAHER Evolving a Design Focus in Response to Design Solutions	161
M.V. NAGENDRA PRASAD, SUSAN E. LANDER, AND VICTOR R. LESSER The Role of Learning in Systems of Reusable Heterogeneous Design Agents	163
SUDHAKAR Y. REDDY Learning Abstract Models for System Design	167
YORAM REICH Modelling Engineering Information with Machine Learning	171
THORSTEN SCHNIER AND JOHN S. GERO Learning Representations for Creative Design Using Evolution	175
MARK SCHWABACHER, THOMAS ELLMAN, AND HAYM HIRSH Inductive Learning for Engineering Design Optimization	179
Kosuke Ishii Book Review of: Engineering Design: A Synthesis of Views	181



## VOLUME 10

## APRIL 1996

## NUMBER 2

## Special Issue: Machine Learning in Design

Guest Editorial	
Alex H.B. Duffy, David C. Brown, and Mary Lou Maher	
Special Issue: Machine Learning in Design	81
Articles	
Sandra M. Duffy and Alex H.B. Duffy	
Sharing the Learning Activity Using Intelligent CAD	83
Tim Murdoch and Nigel Ball	
Machine Learning in Configuration Design	101
B.D. Britt and T. Glagowski	
Reconstructive Derivational Analogy: A Machine Learning Approach	
to Automating Redesign	115
Research Abstracts	
Tomasz Arciszewski	
Learning Engineering: The Key to Automatic Knowledge Acquisition	127
Sambasiva R. Bhatta and Ashok K. Goel	
From Design Experiences to Generic Mechanisms: Model-Based Learning	
in Analogical Design	131
David C. Brown	
Knowledge Compilation in Routine Design Problem Solving Systems	137
Alex H.B. Duffy and Sandra M. Duffy	
Learning for Design Reuse	139
BOI FALTINGS	
Learning to Cope with an Open World	143



