

Theory and Practice of Logic Programming

Published in association with the
Association for Logic Programming

Editor-in-Chief

I Niemelä, *Helsinki University of Technology, Finland*

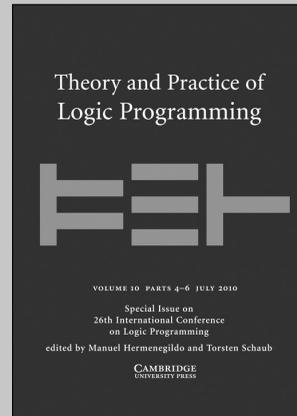
Theory and Practice of Logic Programming emphasises both the theory and practice of logic programming. Logic programming applies to all areas of artificial intelligence and computer science and is fundamental to them. Among the topics covered are AI applications that use logic programming, logic programming methodologies, specification, analysis and verification of systems, inductive logic programming, multi-relational data mining, natural language processing, knowledge representation, non-monotonic reasoning, semantic web reasoning, databases, implementations and architectures and constraint logic programming.

Price information

is available at: <http://journals.cambridge.org/tlp>

Free email alerts

Keep up-to-date with new material – sign up at
<http://journals.cambridge.org/alerts>



Theory and Practice of Logic Programming

is available online at:
<http://journals.cambridge.org/tlp>

To subscribe contact Customer Services

in Cambridge:

Phone +44 (0)1223 326070
Fax +44 (0)1223 325150
Email journals@cambridge.org

in New York:

Phone +1 (845) 353 7500
Fax +1 (845) 353 4141
Email
subscriptions_newyork@cambridge.org

For free online content visit:
<http://journals.cambridge.org/tlp>



CAMBRIDGE
UNIVERSITY PRESS

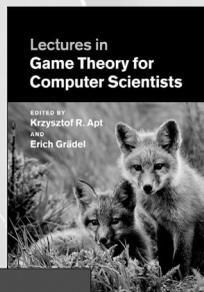
CAMBRIDGE

Great New Books in Programming!

Lectures in Game Theory for Computer Scientists

Edited by Krzysztof R. Apt, Erich Grädel

\$72.00: Hardback: 978-0-521-19866-0: 312 pp.

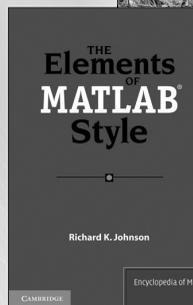


The Elements of MATLAB Style

Richard K. Johnson

The Elements of MATLAB Style is a guide for both new and experienced MATLAB programmers that offers a collection of standards and guidelines for creating solid MATLAB code that will be easy to understand, enhance, and maintain. This is the only book devoted to MATLAB style and best programming practices.

\$19.99: Paperback: 978-0-521-73258-1: 184 pp.



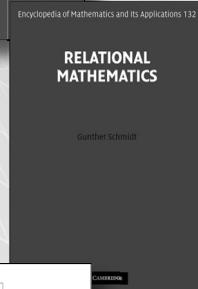
Relational Mathematics

Gunther Schmidt

A modern, comprehensive overview providing an easy introduction for applied scientists who are not versed in mathematics.

Encyclopedia of Mathematics and its Applications

\$99.00: Hardback: 978-0-521-76268-7: 582 pp.



Networks, Crowds, and Markets

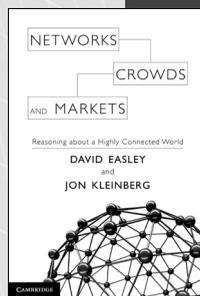
Reasoning About a Highly Connected World

David Easley, Jon Kleinberg

"The field of information networks is an emerging discipline of immense importance that combines graph theory, probability and statistics, microeconomics and facets of the social sciences. Easley and Kleinberg present a panoramic view of this field, from basic graph theory all the way to the state of the art in research."

—Prabhakar Raghavan, *Head of Yahoo! Labs*

\$50.00: Hardback: 978-0-521-19533-1: 744 pp.



Prices subject to change.

www.cambridge.org/us/computerscience
800.872.7423



CAMBRIDGE
UNIVERSITY PRESS

The Knowledge Engineering Review

Editors-in-Chief

Peter McBurney, *University of Liverpool, UK*

Simon Parsons, *Brooklyn College, City University of New York, USA*

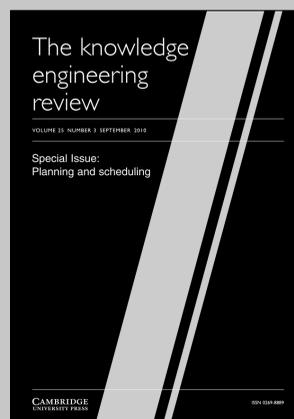
The Knowledge Engineering Review is committed to the development of the field of artificial intelligence and the clarification and dissemination of its methods and concepts. *KER* publishes analyses – high quality surveys providing balanced but critical presentations of the primary concepts in an area; technical tutorials – detailed introductions to an area; application and country surveys commentaries and debates; book reviews; and a popular ‘from the journals’ section, providing the contents of current journals in theoretical and applied artificial intelligence.

Price information

is available at: <http://journals.cambridge.org/ker>

Free email alerts

Keep up-to-date with new material – sign up at
<http://journals.cambridge.org/ker-alerts>



The Knowledge Engineering Review

is available online at:
<http://journals.cambridge.org/ker>

To subscribe contact Customer Services

in Cambridge:

Phone +44 (0)1223 326070
Fax +44 (0)1223 325150
Email journals@cambridge.org

in New York:

Phone +1 (845) 353 7500
Fax +1 (845) 353 4141
Email
subscriptions_newyork@cambridge.org

For free online content visit:
<http://journals.cambridge.org/ker>



CAMBRIDGE
UNIVERSITY PRESS

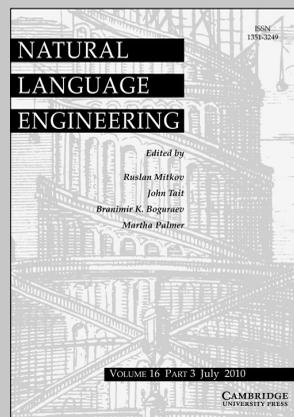
CAMBRIDGE

JOURNALS

Natural Language Engineering

Executive Editor

Ruslan Mitkov, *University of Wolverhampton, UK*



Natural Language Engineering meets the needs of professionals and researchers working in all areas of computerised language processing, whether from the perspective of theoretical or descriptive linguistics, lexicology, computer science or engineering. Its aim is to bridge the gap between traditional computational linguistics research and the implementation of practical applications with potential real-world use. The journal publishes research articles on a broad range of topics, an industry-watch column and book reviews. *JNLE* now includes surveys, as well as squibs discussing specific problems.

Natural Language Engineering

is available online at:
<http://journals.cambridge.org/nle>

To subscribe contact Customer Services

in Cambridge:

Phone +44 (0)1223 326070
Fax +44 (0)1223 325150
Email journals@cambridge.org

in New York:

Phone +1 (845) 353 7500
Fax +1 (845) 353 4141
Email
subscriptions_newyork@cambridge.org

Price information

is available at: <http://journals.cambridge.org/nle>

Free email alerts

Keep up-to-date with new material – sign up at
<http://journals.cambridge.org/nle-alerts>

For free online content visit:
<http://journals.cambridge.org/nle>



CAMBRIDGE
UNIVERSITY PRESS

INSTRUCTIONS TO AUTHORS

Scope

Papers may describe original technical work, survey an area, or present a tutorial; and may be either short or long. Anything related to functional programming is of interest, including: *foundations* (semantics, abstract interpretation, lambda calculi, rewriting, logic, type theory, category theory); *implementation* (compilation, architectures, parallelism, garbage collection, I/O, debugging, profiling); *linguistics* (pure and impure language features, non-determinism, side effects, logical variables, relation to other programming paradigms, proofs about programs, program transformation, program synthesis, partial evaluation); *applications* (applications programs, practical experience, programming techniques, prototyping).

Book Reviews

Books for review, or suggestions for reviews, should be sent to the reviews editor, Simon Thompson (address on inside front cover).

Submission of manuscripts

Papers may be submitted to the Editors-in-Chief or any of the editors or directly to JFP-ed@cambridge.org. Please choose an Editor whose research interests most closely match your paper; if in doubt, send your paper to one of the Editors-in-Chief. E-mail and postal addresses for the editors appear on the inside front cover.

Please refer to journals.cambridge.org/JFP for all detailed information associated with the submission of papers to the journal.

Offprints

No paper offprints are provided, but a pdf of the published article will be sent to the corresponding author.

Incremental Publishing and DOIs

The Journal of Functional Programming now publishes articles as First View (at Cambridge Journals Online: journals.cambridge.org) as soon as author corrections have been completed and before they join a printed issue. A reference is added to the first page of the article in the journal catchline. This is the DOI—the Digital Object Identifier. This is a global publishers' standard. A unique DOI number is created for each published item. It can be used for citation purposes instead of volume, issue and page numbers. It therefore suits the early citation of articles which are published on the web before they have appeared in a printed issue. journals.cambridge.org/JFP

SUBSCRIPTIONS

Journal of Functional Programming (ISSN: 0956-7968 print, 1469-7653 electronic) is published in six parts in 2011, January, March, May, July, September and November. The subscription price (excluding VAT) of Volume 21, 2011, is £375 net (USA, Canada and Mexico US\$610) institutions print and electronic; institutions electronic only is £350, \$560; individuals print only is £105, \$165; Member rates available—please enquire; single parts cost £60 net (USA, Canada and Mexico US\$120) plus postage. EU subscribers (outside the UK) who are not registered for VAT should add VAT at their country's rate. VAT registered subscribers should provide their VAT registration number. Orders, which must be accompanied by payment, may be sent to any bookseller, subscription agent or to the publisher: Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 8RU, or in the USA, Canada and Mexico to Cambridge University Press, Journals Fulfillment Department, 100 Brook Hill Drive, West Nyack, New York 10994–2133. Prices include delivery by air where appropriate. Application to mail at periodicals postage rates is pending at New York, NY and at additional mailing offices. Japanese prices for institutions are available from Kinokuniya Company Ltd, P.O. Box 55, Chitose, Tokyo 156, Japan. Postmaster: send address changes in USA, Canada and Mexico to *Journal of Functional Programming*, Cambridge University Press, 100 Brook Hill Drive, West Nyack, New York 10994–2133. Claims for missing issues should be made immediately on receipt of the subsequent issue.

COPYING

This journal is registered with the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA, 01923, USA. Organisations in the USA who are also registered with the C.C.C. may therefore copy material (beyond the limits permitted by sections 107 and 108 of US copyright law) subject to payment to C.C.C. of the per-copy fee of \$16. This consent does not extend to multiple copying for promotional or commercial purposes. Code 0956-7968/11 \$16.

Organisations authorised by the Copyright Licensing Agency may also copy material subject to the usual conditions.

ISI Tear Service, 3501 Market Street, Philadelphia, Pennsylvania 19104, USA, is authorised to supply single copies of separate articles for private use only.

For all other use, permission should be sought from Cambridge or the American branch of Cambridge University Press.

JOURNAL OF
Functional Programming

VOLUME 21 PART 2 MARCH 2011

CONTENTS

FUNCTIONAL PEARLS	
Building a consensus: A rectangle covering problem	
RICHARD S. BIRD	119
The Hough transform	
MAARTEN FOKKINGA	129
More on balanced diets	
OLIVER FRIEDMANN AND MARTIN LANGE	135
Roles, stacks, histories: A triple for Hoare	
JOHANNES BORGSTRÖM, ANDREW D. GORDON AND RICCARDO PUCELLA	159
Short note: Strict unwraps make worker/wrapper fusion totally correct	
PETER GAMMIE	209
Book reviews	215

Cambridge Journals Online
For further information about this journal
please go to the journal website at:
journals.cambridge.org/jfp



Mixed Sources
Product group from well-managed
forests and other controlled sources
www.fsc.org Cert no. SA-COC-1527
© 1996 Forest Stewardship Council

CAMBRIDGE
UNIVERSITY PRESS