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Editor's Introduction

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Editor's Introduction

The first paper, *A Neural Network Implementation of a Data Association Algorithm*, by Allen L. Barker, Donald E. Brown and Worthy N. Martin, pertains to a database that is evolving continually. The problem is to maintain the integrity of the reports—that is, the consistency between the database reports and the sensor reports. The authors present a neural network implementation of their "fusion algorithm" and prove its convergence. Their empirical analysis includes Type I and Type II errors.

The second paper, *Matrix Balancing on a Massively Parallel Connection Machine*, by Stavros A. Zenios, presents both synchronous and asynchronous parallel versions of the iterative scaling algorithm (RAS). The author describes the problem and its many applications in econometrics and engineering, the RAS algorithm, and the CM environment. Using the Connection Machine (CM2), the test matrices have dimensions up to 1,000 × 1,000 with 990,000 nonzeroes.

The third paper, *Generating Markov-Chain Transitions Quickly: I*, by Bennett L. Fox, presents a new way to generate transitions directly from a compact representation of a problem class that includes queueing networks and reliability. The author shows conditions under which this method is faster than a future-event schedule calculation.

The fourth paper, *An Introduction to Graph-Based Modeling Systems, Part I: Overview*, by Christopher V. Jones, is the first of a 2-part paper that gives a comprehensive presentation of a modeling system founded in "graph grammars," which were originally developed in the mid 1970s in Germany. This work represents a new formalism for computer modeling of OR problems, drawing also from other disciplines in both computer science and OR-related mathematics. The GBMS principles were tested with an implementation on a Macintosh.

The fifth paper, *The Influence of Computer Language on Computational Comparisons: An Example from Network Optimization*, by Irvin J. Lustig, articulates what practitioners have known ad hoc. Namely, the computer language can have a dramatic impact on the computational efficiency. This study compares C and FORTRAN on implementations of the network simplex method. One of the striking contributions is a clear exposition of the linking and pointing structures with generated assembly code to demonstrate the results concretely.

The sixth paper, *Parallel Solution of Sparse One-Dimensional Dynamic Programming Problems*, by David M. Nicol, reflects on the current infancy of parallel computation. Presently, there is much art to exploit the architecture, and this paper is about reformulation. The particular dynamic programming problems provide specific cases to study, but some of the results are more general. Of additional importance is the author's experimental design.

The seventh paper, *Using Simulated Annealing to Solve Controlled Rounding Problems*, by James Kelly, Bruce Golden and Arjang Assad, pertains to the problem of how to perturb a database to protect the anonymity of the contributors (respondents to a survey, for example) while maintaining the database integrity. The problem is combinatorially difficult, and the authors present an algorithm based simulated annealing, linear programming and binary search. The algorithm appears faster than others based on an empirical study that includes both real cases and randomly generated ones.

The eighth paper, *Manipulation and Visualization of Sparse Matrices*, by Fernando L. Alvarado, reports the design of a system (SMMS) to manipulate and graphically display sparse matrices. As with MatVu (in 2:1), this reflects the emergence of new environments for analysis using graphics to gain insight into problem or algorithm structures.

Collectively, these papers illustrate some of the scope of the interfaces between operations research and computer science. You are urged to read our statement of scope and complete *Instructions for Contributors*, which appear in the first issue of each volume.

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Editor