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Editor's Introduction

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Editor's Introduction

This last issue of Volume 1 reflects growing interests in the interfaces between operations research (OR) and computer science (CS). The following papers span optimization and stochastic processes; modeling and methodology; theory and application; established and uncharted topics. All this is without dichotomy, building on integration of concepts.

The first paper, *Series-Parallel Bounds for the Two-Terminal Reliability Problem*, by Hosam M. AboElFotoh and Charles J. Colbourn, presents an approach to a difficult combinatorial problem: What is the probability there exists a path from a specified source to a specified destination in a given probabilistic graph? One approach to such a problem is to solve a simpler problem that yields bounds. This had been done with edge-packing. The present alternative exploits favorable properties of series-parallel networks to establish both lower and upper bounds for the original problem. The complexity analysis reveals a worst time that is quadratic on the number of edges, and a (modest) computational study suggests the present method yields sharper bounds.

The second paper, *Modeling Networks with Dynamic Topologies*, by Robert L. Moose, Jr., considers a hierarchy of M/M/1 queues as a local area network in a random environment. The randomness pertains to how the queuing systems are connected to each other—that is, the topology of the network. After setting the theoretical foundations, simulation experiments are described. One interesting conclusion is how the accuracy of the theoretical values improves with more traffic.

The third paper, *A Neural Network-Based Optimization Algorithm for the Weapon-Target Assignment Problem*, by Eitan Wacholder, addresses an old problem with a new approach. The problem is military command, control and communication of defensive weapon allocation under perfect information about an attack. The approach is an optimization algorithm using neural networks for massively parallel computation under real-time response circumstances. The newness is in the algorithm design, especially for a computer architecture that is still undergoing research. A principal contribution of this paper is the demonstration that a neural network can be designed to solve the nonlinear combinatorial optimization problem that represents the C^3 problem.

The fourth paper, *Anomalous Acceleration in Parallel Multiple-Cost-Row Linear Programming*, by Andrew T. Phillips and J. Ben Rosen, gives a simple example that demonstrates how to obtain a speedup greater than the number of processors. The class of problems has asymptotic growth in the average speedup as the number of variables gets large.

The fifth paper, *Preprocessing in Stochastic Programming: The Case of Uncapacitated Networks*, by Wallace W. Stein and Roger J.-B. Wets, uses known results about feasibility and redundancy (notably the Gale-Hoffman network feasibility theorem) to preprocess a 2-stage recourse model. The reason for doing so is to reduce the solution time, especially to eliminate infeasible solutions that may be considered by certain (serial) algorithms for the stochastic program. The elimination is done by derived cuts, and the feasibility theorems may be used for facet generation.

The sixth paper, *Continuous Models for Capacity Design of Large Packet-Switched Telecommunication Networks*, by Larry J. LeBlanc and Ronald V. Simmons, presents a convex programming model for design of large-scale PST Nets. Compared with less tractable models, the authors show circumstances under which this model provides good solutions for networks up to 100 nodes and about 3500 links. Computational results are included with the observation that the LaGrange multiplier obtained from the convex solution provides a good starting value for the nonconvex model.

The seventh paper, *Implementation of a Dual Affine Interior Point Algorithm for Linear Programming*, by Roy E. Marsten, Matthew J. Saltzman, David F. Shanno, George S. Pierce, and J. F. Ballintijn, extends previous implementations to deal directly with simple bounds on primal variables. The modifications affect not only the algebra performed during the iterations, but also the starting point and final purification. Of special interest is their dynamic detection of nonbasic primal variables with associated column dropping. This paper includes a computational study using some of the NETLIB problems.

In closing, I draw your attention to *Appreciation to Referees*, and to the newly created *Software Section*, guidelines that appear in this issue.

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Editor