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TRANSITION TO ADVANCED MARKET ECONOMIES

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Jacek Stefanski
Andrzej Straszak

SESSION 14

OPTIMIZATION METHODS

EFFECTIVE ALGORITHMS FOR LARGE CLASSES OF LINEAR DIOPHANTINE EQUATIONS IN NON-NEGATIVE INTEGERS

Valentin E. Brimkov

Institute of Mathematics,
Sofia, Bulgaria

The paper considers the linear Diophantine problem for finding non-negative integer solution of linear Diophantine equation with positive coefficients. This problem has some direct applications, but also some algorithms for more general combinatioral optimization problems use solving linear equations as subroutine. Because of its simplicity, the problem is used as a model one for searching and testing new ideas, algorithms, etc. The NP-hardness of the problem makes it interesting of complexity theory viewport.

We have proposed effective algorithms solving large subclasses of the linear Diophantine problem. As a consequence it follows that the class of equations with coefficients bounded by a polynomial of the problem input size is polynomial solvable. Outcomes of some experiments are commmented and theoretical results, connected with considered problem are obtained.

LAGRANGE OPTIMIZATION ON ATTRACTORS

Anatoly Kolesnikov and Anatoly Gaiduk

Taganrog Radioengineering Institute,
Taganrog, Russia

Optimization of the business, marketing, production, scientific research and the other processes very often leads to calculation difficulties which are conditioned by high dimensionality, incorrectnes and high number of extrema of such problems. Incorrectness can be overcome by using the Lagrange multiplier method but efficiency of this method increases if the problem is decomposed in accordance with attractors (attractive multiforms) which are in the process state space.

In the paper we suggest a new original method of constructing attractors for the optimized problem in order to obtain effective algorithm of optimization, to obtain desired property of the optimal solution. The method has a wide field of application and in particular it can be used in modern optimization expert system or automated control systems.

METHODS FOR IMPROVING WEIGHTS IN COLUMN AGGREGATION

Sverre Støroy

University of Bergen,
Bergen, Norway

There may be several reasons for aggregating variables in large linear programs. The loss in accuracy measured by the value of the objective function has been studied by many authors, and good bounds are given. In the present paper we study how the weights used to aggregate the variables may be changed iteratively in order to improve the objective value. The methods are based on dual information from the aggregated problem and are rather simple to implement.

CHANNELS OF DISTRIBUTION PLANNING SYSTEM BASED ON FUZZY-STOCHASTIC GEOMETRIC PROGRAMMING

Nickolaj Chr. Mincoff, Daniela Karastojanova, Evdokia B. Krasteva, George Sotirov

Technical University of Sofia,
Sofia, Bulgaria

It is well known that distribution optimization of channelsin multiple-channel systems is one of the increasingly important problems for company marketing strategy. In this paper we describe a fuzzy extended mathematical programming model for resource allocation among a set of alternative distribution channels. The model covers three kinds of marketing decisions: distribution strategy - selection of channel structure, distribution intensity - choice of the optimal number of outlets to operate within each channel, and distribution managament - determination of the preferable pricing structure between the channels. Optimization is subject to a number of operational constraints concerning the company capacity limits, channel control ranges, and distribution system inflexibilities.

The model is treated as chance-constrained geometric programming problem with fuzzy elicitated mean values and standard deviations. For this kind of problems effective deterministic transformation and numerical algorithm are developed by the authors. The algorithm uses LP-approximation combined with branch-and-bound techniques for solving geometric programming problems with discrete variables. Based on this approach a decision support system for marketing decision making is built. Paper presentation will be accompanied with computer software/case study illustration.

MULTICRITERIA REGIONAL PLANNING IN AN UNCERTAIN ENVIRONMENT

Piotr Czyżak and Roman Słowiński

University of Poznań,
Poznań, Poland

A regional planning problem formulated in terms of multi-objective linear programming (MOLP) is considered. The uncertain environment, in which the problem is solved, implies imprecision of model coefficients. They are defined as L-R type fuzzy numbers. For solving the MOLP problem with fuzzy coefficients, we propose a visual interactive method, called 'FLIP'. It transforms the fuzzy MOLP problem into a non-fuzzy multi-objective linear fractional programming problem which is solved using an interactive sampling method. An evaluation of the quality of successive proposals (solutions) is based on the following characteristics: (i) scores of fuzzy objectives in relation to the goals, (ii) dispersion of values of the fuzzy objectives due to uncertainty, (iii) safety of solutions or risk of violation of the constraints. The graphics displayed by 'FLIP' provide the most comprehensive synthesis of these characteristics.

DECENTRALIZATION OF A LARGE SCALE TRANSPORTATION SYSTEM BY TERRITORIAL DECOMPOSITION

Stanisław Łukasik and Piotr Kowalski

Systems Research Institute
Polish Academy of Sciences
Warsaw, Poland

In this paper a two-level procedure is described meant to find the optimal territorial (organizational) decomposition for a commodity transportation system.

Let G = , *E, D be a graph corresponding to the road system.*
I-denotes the set of nodes (depots), E-set of edges, D-distances.

A subset of depots J C I, is hierarchically higher and aggregates the commodity streams for spedition.

The transportation system has to be decomposed into a set of economically competitive subsystems

The structural decision variables of the problem describe the aggregation process of the commodity streams and the structure of decomposition.

The aim of the paper is to present a two-level discrete optimization procedure. The proposed method uses the generalized discrete-gradient (greedy) algoritm and two-level coordination principles.

An example concerning a real transportation system is presented.

DISCRETE OPTIMIZATION ON TRANSPUTERS

Leon Słomiński

Systems Research Institute
Polish Academy of Science
Warsaw. Poland

Discrete optimization models and techniques play an important role in the area of OR/MS/AI. The multiknapsack problem serves as an abstract model for many real-life decision making and management tasks. High-performance computers are necessary for solving large-scale problems in a short time. Parallel computers provide new possibilities for meeting there challenges. Transputers offer an easy and cheap way for introducing parallelism. A transputer is a single VLSI device with memory, processor and communication links for direct connection to other transputers. Parallel systems can be constructed form a collection of transputers which operate concurrently and communicate through links. The results of experiments on solving multiknapsack problems with the use of Quintek quadputer (four T805-30 transputers) board, pluged into IBM PC, will be reported and discussed.