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Towards 2000

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Edited by
L.M. Venter
R.R. Lombard
Foreword

This book contains a collection of papers presented at a Research and Development conference of the South African Institute of Computer Scientists and Information Technologists (SAICSIT). The conference was held on 13 & 14 November 1997 at the Riverside Sun, Vanderbijlpark. Most of the organization for the conference was done by the Department of Computer Science and Information Technology of the Vaal Triangle Campus, Potchefstroom University for Christian Higher Education.

The programming committee accepted a wide selection of papers for the conference. The papers range from detailed technical research work to reports of work in progress. The papers originate mainly from Academia, but also describe work done in and for Industry. It is hoped that the papers give a true reflection of the current research scene in Computer Science and Information Technology in South Africa. Since one of the aims of the conference is Research development, the papers were not subjected to a refereeing process.

A number of people spent numerous hours helping with the organization of this conference. In this regard, we wish to thank the members of the Organizing committee, and the Programming committee who had very little time to screen the abstracts and compile the program. A special thanks goes to the secretary of the department, Mrs Helei Jooste, whose very able work was interrupted by the birth of her first child.
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Cardinality Constrained 0-1 Knapsack Problems.

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Abstract.

The Knapsack Problem is one of the most important problems in Discrete optimization. Although it is the simplest integer program, it has numerous practical applications and often appears as a subproblem in solving more complicated problems.

Inspired by recent research results we take a closer look at a new emerging problem, the cardinality constrained 0-1 knapsack problem. If one knows the cardinality (i.e. the number of items packed into the knapsack) of an optimal solution one can solve the equivalent problem where the cardinality constraint is an equality constraint. We propose an exact algorithm based on Lagrangian relaxation for this problem. We introduce a specialized iterative, but finite, technique for determining the optimal Lagrange multipliers and report on the results of numerical experiments with our algorithm.

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