

A Decision Support System for Solving Linear Programming Problems

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ABSTRACT

Linear programming algorithms have been widely used in Decision Support Systems. Decision Support Systems for real world applications, i.e. supplier selection, forest management, energy planning, resource allocation etc., have already been proposed. These systems have incorporated linear programming algorithms for the solution of the given problems. Yet, the special structure of each linear problem may take advantage of different linear programming algorithms or different techniques used in these algorithms.

In this paper, we propose a web-based Decision Support System that assists decision makers in the solution of linear programming problems with a variety of linear programming algorithms and techniques. Two linear programming algorithms have been included in the Decision Support System: (i) revised simplex method and (ii) exterior primal simplex algorithm. Furthermore, a variety of different techniques have been implemented for each step of the algorithms. Ten scaling techniques, five basis update methods and eight pivoting rules have been incorporated in the Decision Support System. The decision maker can either select the desired algorithm and the appropriate methods to solve a linear programming problem or perform a computational study with all combinations of algorithms and methods in order to export a detailed report.

All linear programming algorithms and methods have been implemented using MATLAB and converted to Java classes using MATLAB Builder JA, while the web interface of the DSS has been designed using Java Server Pages.

Keywords: Decision Making, Web-based Decision Support Systems, Linear Programming, Revised Simplex Method, Exterior Primal Simplex Algorithm.