TEC | Tecnológico de Costa Rica

Computer Science
Operations Research

Simplex Algoritm

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1 The Simplex Algorithm

The simplex algorithm, developed by George Dantzig in 1947, arises from the need to solve linear programming problems.m This problem was fundamentally proposed by Kantorovich and Koopman, who developed the optimal location problem and the problem of resources. The Simplex method optimizes an objective function subject to linear constraints, using an iterative process to improve the value of the objective function until the optimal solution is reached. Its ability to solve complex problems and its use in various applications make it an essential tool in the optimization of resources and strategic decisions in industry, economics, and operations research.

Given the time of its development, it was essentially thought to be solved by hand; however, now there are digital tools that allow the process to be automated.

1.1 George Dantzig

The American mathematician was born in 1914 and died in 2005. In addition to being the creator of the Simplex algorithm, he was head of the Scientific Computing of Operations Research (SCOOP), where he promoted linear programming for strategic purposes during World War II.

Z	x_1	x_2	s_1	s_2	b
1.000	-4.000	-14.000	0.000	0.000	0.000
0.000	2.000	7.000	1.000	0.000	21.000
0.000	7.000	2.000	0.000	1.000	21.000

2 Result Analysis

Z	x_1	x_2	s_1	s_2	b
1.000	0.000	0.000	2.000	0.000	42.000
0.000	0.286	1.000	0.143	0.000	3.000
0.000	6.429	0.000	-0.286	1.000	15.000

Z	x_1	x_2	s_1	s_2	b
1.000	0.000	0.000	2.000	0.000	42.000
0.000	0.286	1.000	0.143	0.000	3.000
0.000	6.429	0.000	-0.286	1.000	15.000

3 Multiple Solutions

Z	x_1	x_2	s_1	s_2	b
1.000	0.000	0.000	2.000	0.000	42.000
0.000	0.286	1.000	0.143	0.000	3.000
0.000	6.429	0.000	-0.286	1.000	15.000

Z	x_1	x_2	s_1	s_2	b
1.000	0.000	0.000	2.000	0.000	42.000
0.000	0.000	1.000	0.156	-0.044	2.333
0.000	1.000	0.000	-0.044	0.156	2.333

4 Graph