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1 HW1 Math 340

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2 Founding fathers of Linear Programming

Math 340 Introduction to Linear Programming

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This is a brief history of the topic or field of Math: Linear Programming (**LP**), and its three founding fathers: **Kantorovich**, **Von Neumann**, and **Dantzig**. Hence, let's first describe and define what is LP. Based on an well known textbook of the field of LP, *Linear Programming Foundations and Extensions* from lead scholar *Robert J. Vanderbei*, LP is simply a type of constrained optimization problem, whereas its goal is "always to maximize or to minimize some linear function of decision variables", said Vanderbei (Vanderbei, Ch 1. Introduction, section 2. ,pg 6). Therefore, it is usual to observe LP in real-world cases, i.e. in economical optimizations or transportation or computer science algorithms. Moreover, the subject of LP has its roots in the study of linear inequalities, ... to the work of Fourier (Vanderbei, Ch 1. Introduction Notes, pg 32).

In addition, other mathematicians and economists have also contributed in the development of the field of LP, specifically mentioning its three founding fathers that started the basis and set foundations of LP: **L.V. Kantorovich**, who first noted in 1939 a practical importance of a certain class of linear programming problems (Economic Allocations problems) in *The Mathematical Method of Production Planning and Organization*, whereas he showed that these types of problems can be seen as maximizing a function subject to constraints (Econlib) and proposed an algorithm (now Linear Programming) to solve these kinds of problems, however his works was unknown in the West and unnoticed in the East for several years until the appearance of another mathematician; **G.b. Dantzig**, who later took on the subject of LP in 1947 after *Kantorovich*, and invented the *simplex method* for solving the LP problems that arose in U.S. Air Force planning problem, which the method would later turned into important algorithm or method of the field and studied by many other contributors and successors; **John von Neumann**, another founding father, who collaborated with *Dantzig* in many fields like mathematics, computer science, atomic physics, and greatly acknowledged by the former (Dantzig, Linear Programming). He invented the theory of duality in LP, and also take LP to an extent level of Game Theory (Vanderbei, Ch 11. Game Theory), a type of matrix games that could be solved by minimax and the duality theorem. And, founded another branch and extension of LP, dynamic programming, which forms in many solutions of modern computer algorithm optimization problems.

Besides these three founding fathers that contributed mostly on LP, there were other mathematicians, economists, statisticians and computer scientist whom worked on to develop the field. We should thanks to all these researchers/scholars that provided useful theorems and methods that allowed us to solve practical problems of present.

Sources:

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