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NOTES

ERRATUM: A COMPUTATIONAL ERROR IN A NONLINEAR PROGRAMMING EXAMPLE*

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In an early paper, Griffith and Stewart (1961) presented a method for applying linear programming to a linearized form of some nonlinear programming problems. An arithmetic error in the numerical example given in that paper is discussed, and corrected values of the example are presented.
(NONLINEAR OPTIMIZATION)

In an early paper, Griffith and Stewart (1961) presented a method for applying linear programming to a linearized form in order to solve some nonlinear programming problems. That paper was subsequently referenced by Goicoechea (1982) in the development of a computer program for use of a cutting-plane technique for nonlinear optimization. The attempt to verify the results of the numerical example presented in Griffith and Stewart using a complete implementation of Goicoechea's program revealed a discrepancy in those results. A comprehensive review of successive linear programming methods based on Griffith and Stewart is presented in Palacios-Gomez et al. (1982), and although a comparison of implementations of the methods upon a set of test problems is discussed, no reference is made to the original problem.

The numerical example considered is

$$\text{Maximize} \quad G = 2x + y \qquad \text{Subject to} \quad x^2 + y^2 \leqslant 25, \quad x^2 - y^2 \leqslant 7, \quad x, y \geqslant 0,$$

and the linearized problem is

$$\text{Maximize} \quad G = 2(x - x_0) + (y - y_0) + 2x_0 + y_0 \qquad \text{Subject to}$$

$$2x_0(x - x_0) + 2y_0(y - y_0) \leqslant 25 - x_0^2 - y_0^2,$$

$$2x_0(x - x_0) - 2y_0(y - y_0) \leqslant 7 - x_0^2 + y_0^2,$$

$$x, y \geqslant 0, \quad -1 \leqslant x - x_0 \leqslant 1, \quad -1 \leqslant y - y_0 \leqslant 1.$$

At the third step of the solution, the LP solution is given as: $(x_0, y_0) = (4, 17/6)$; $G = 65/6 = 10.833$. That solution is incorrect; the correct values are: $(x_0, y_0) = (4, 19/6)$; $G = 67/6 = 11.167$. This makes the fourth LP problem:

IV. Set $(x_0, y_0) = (4, 17/6)$; $G_0 = 67/6$

$$\text{LP}_{\text{IV}}: \quad G = 2(x - 4) + [y - (17/6)] + (67/6),$$

$$8(x - 4) + (17/3)[y - (17/6)] \leqslant -(37/36),$$

$$8(x - 4) - (17/3)[y - (17/6)] \leqslant (37/36).$$

$$\text{LP solution:} \quad (x_0, y_0) = (4.000, 3.004); \qquad G = 11.004.$$

*All Notes are refereed.

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Then the fifth LP problem is:

V. Set $(x_0, y_0) = (4.000, 3.004)$; $G_0 = 11.004$

$$\text{LP}_\text{V}: \quad G = 2(x - 4.000) + (y - 3.004) + 11.004,$$
$$8(x - 4.000) + 4.757(y - 3.004) \leqslant -0.0263,$$
$$8(x - 4.000) - 4.757(y - 3.004) \leqslant 0.0263.$$
$$\text{LP solution:} \quad (x_0, y_0) = (4.000, 2.999); \qquad G = 10.999.$$

A sixth problem is required to obtain the optimal solution correct to four significant figures, $(x_0, y_0) = (4.000, 3.000)$; $G = 11.000$.

This note is solely provided to aid others who may attempt to verify their methodology with the Griffith and Stewart example.[1]

[1]The authors would like to thank the Editor for saving us from an error which would have generated a further Erratum at some time in the future.

References

GOICOECHEA, AMBROSE, DON R. HANSEN AND LUCIEN DUCKSTEIN, *Multiobjective Decision Analysis with Engineering and Business Applications*, John Wiley & Sons, New York, 1982.

GRIFFITH, R. E. AND R. A. STEWART, "A Nonlinear Programming Technique for the Optimization of Continuous Processing Systems," *Management Sci.*, 7 (1961), 379–392.

PALACIOS-GOMEZ, F., L. LASDON AND M. ENGQUIST, "Nonlinear Optimization by Successive Linear Programming," *Management Sci.*, 28 (1982), 1106–1120.

NOTES

ROLLING BACK DECISION TREES REQUIRES THE INDEPENDENCE AXIOM!*

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The Herstein–Milnor independence axiom is a necessary condition for recursion analysis of decisions in extensive (= tree) form.

(DECISION ANALYSIS FOUNDATIONS; INDEPENDENCE AXIOM; SURE-THING PRINCIPLE)

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