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Transformation Technique to Solve Multiobjective Linear Fractional Programming Problem

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Abstract – Linear fractional programming problems are useful tools in production planning, financial and corporate planning, health care and hospital planning and as such have attracted considerable research interest.

Keywords: Linear Programming, Mathematical Technique, Transformation

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INTRODUCTION

Linear programming is a mathematical technique aimed at identifying optimal maximum or minimum values of a problem subject to certain constraints [1], while a linear fractional programming (LFP) problem is one whose objective function has a numerator and a denominator and are very useful in production planning, financial and corporate planning, health care and hospital planning. Several methods to solve this problem have been proposed [2]. Charnes and Kooper [3], have proposed a method which depends on transforming the LFP problem to an equivalent linear program. Another method which is called up dated objective function method was also derived to solve the linear fractional programming problems by re-computing the local gradient of the objective function [4]. Also some aspects concerning duality and sensitivity analysis in linear fraction program was discussed by Bitran and Magnant [5]**.**

REVIEW OF LITERATURE:

Linear fraction maximum problems (i.e. ratio objective that have numerator and denominator) have attracted considerable research and interest, since they are useful in production planning, financial and corporative planning, health care and hospital planning. Several methods to solve such problems are proposed in (1962) [6]. Their method depends on transforming the linear fractional programming to an equivalent linear program. Sing (1981) in his paper did a useful study about the optimality condition in fractional programming [7]. A multi-objective linear programming problem (MOLPP) is solved by Chandra Sen. in (1983)[8]; Sulaiman and Othman (2007)[10] suggested an approach to construct the multi-objective function. Also Sulaiman and Sadiq in (2006) [9] studied the multi-objective function by using mean and median value [9]. In (1993) Abdil-kadir and Sulaiman[11] studied the multi-objective fractional programming problem. In (2008) Hamad Amin studied multi-objective linear programming problem using Arithmetic Average [12].Also Sulaiman and Salih in (2010) studied the MOLFPP by using mean and median value [13]. In order to extend this work we have defined a MOLFPP and investigated the algorithm to solve fractional programming problem for multi-objective function, irrespective of the number of objectives with less computational burden and suggest a new technique by using average mean, average median, new average mean and new average median values of objective functions, to generate the best optimal solution. The computer application of our algorithm has also been discussed by solving a numerical example. Finally we have shown results and comparisons between different techniques.

$Max.\ Z1 = c1\ tx + \gamma 1$

$Max.\ Z2 = c2\ tx + \gamma 2$

.

. Subject to:

(2.1) $Ax = b\ x > 0$

.

$Max.\ Zr = cr\ t\ x + \gamma r$

$Min.\ Zr{+}1 = cr{+}1\ t\ x + \gamma r{+}1$

.

.

.

$Min.\ Z_s = c_s\ tx + \gamma_s$

Multi-objective fractional programming problem:

Multi-Objective function that are the ratio of two linear objective functions are said to be MOLFPP [1,9] then can be defined:

$Max.\ Z1 = (c1\ tx + \gamma 1)/(d1\ tx + \beta 1)$

$Max.\ Z2 = (c2\ tx + \gamma 2)/(d2\ t\ x + \beta 2)$

.

.

.

$Max.\ Zr = (cr\ tx + \beta r\ )/(dr\ t\ x + \beta r\ )$

$Min.\ Zr{+}1 = (cr{+}1\ t\ x + \beta r{+}1)/(dr{+}1\ t\ x + \beta r{+}1)$

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.

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$Min.\ Zs = (cs\ tx + \gamma s)/\ (ds\ tx + \beta s)$ (3.2)

Subject to:

$Ax =$ (3.3)

$x \geq 0$

Where m −dimensional vector of constants, x is n −dimensional vector of decision variables and A is a$m \times n$matrix of constants other symbols have the same meaning as before [7].

CONCLUSION:

In this paper we found that a method for solving linear fractional functions with constraint functions in the form of linear inequalities is given. The proposed method differs from the earlier methods as it is based upon solving the problem algebraically [15].

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