

# A Study of Solving Mixed Game Theory Problem

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## ABSTRACT

*In this paper, we improve a algorithm and build up its SomeTechniques situated program which can illuminate Mixed Strategies GameTheoryProblem with single result components inside a solitary structure. We build up Some Techniques of computer technique by utilizing the programming language MATHMATICA. The present life is a loaded with battle and rivalries. An extraordinary assortment of focused circumstances is regularly observed. GameTheory must be thought of, in abroad sense, not as a sort of game but rather as focused circumstance, a sort of contention where someone must win and someone must lose. So the capacity of SomeTechniques program in Mixed Strategies GameTheoryProblem.*

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## 1. Introduction

Game theory is a mathematical theory that manages the general highlights of focused circumstances like parlor games, military fights, political battles, promoting and showcasing efforts by contending business firms, etc. The controls most engaged with game theory are mathematics, financial aspects and the other social and conduct sciences. Game theory was established by the great mathematician John von Neumann. The ideas of game theory give a language to formulate structure, break down, and comprehend key situations. In any case, in light of the fact that impressive staff work is required to explore and formulate the issue picked, each position must make his/her own decision before learning the adversary's decision. A large portion of the present issue ought to be picked and for each of the situations formulates as a two man zero-sum game, and after that figure out which issue ought to be picked by every player as per every standard. Be that as it may, on the off chance that we need to decide this procedures and the game an incentive by manual computation then it will require some investment and various emphasis. Consequently, it is important to build up a progressively acceptable methodology which gives the exact solution inside couple of moments.

The key actuality is by all accounts that at whatever point one player's procedure is unsurprising, the adversary can exploit this data to improve his position. Accordingly, a basic element of a balanced arrangement for playing a game, for example, this one is that neither one of the players ought to have the option to find which procedure the other will utilize. Thus, for this situation, instead of applying some known model for deciding a solitary technique that will be utilized, it is important to pick among options adequate systems on some sort of arbitrary premise. By doing this, neither one of the players knows ahead of time which of his own systems will be utilized, not to mention what his adversary will do. This recommends, in exceptionally broad terms, the sort of methodology that is required for games lacking for the manual technique. Numerous different creators proposed various kinds of theoretical discussion of game problems with their methodologies moreover. Be that as it may, they didn't examine computational procedure of game theory. Additionally none of them talked about the entire issue extensively. Consequently on the off chance that we gather information as field work including propelling, ad, battles for contending items and arranging war methodologies for restricting armed forces. These situations are conversely with the ones we have contemplated so far where nature is seen a no vindictive rival. On the off chance that one needs to win, at that point he should to illuminate this information to discover their methodologies and game value. At that point he takes a choice. Be that as it may, on the off chance that the accumulation is a great deal of result, at that point hand calculation is extremely hard and tedious. This recommends us, in extremely broad terms, of computational procedure of game problems which is the reality of consolidated computer technique.

## 2. Solving Game Problems

In this section, we present some existing techniques for solving game problems

1. Graphical Method In game problems, Graphical method might be utilized at whatever point one of the two players has just two (undominated) unadulterated methodologies. As a matter of fact, this strategy advices us to lessen the given  $2 \times n$  or  $2 \times m$  game to an a lot less difficult  $2 \times 2$  game since each  $2 \times n$  or  $2 \times m$  games contains a  $2 \times 2$  sub-game to such an extent that the ideal minimax systems for the  $2 \times 2$  sub game are likewise ideal minimax procedures for the  $2 \times n$  or  $2 \times m$  game, with zero likelihood doled out to every segment not in the  $2 \times 2$  sub-game.

2. Algebraic Method In this strategy we locate the blended methodologies by the arrangement of equation solves. On the off chance that the framework of equations conflicting, at that point we infer that in any event one of the imbalances is an exacting disparity. This framework finishes up a number of equations that is hard to unravel for many variables.

3. Method of Sub-games In this technique sub-isolates the  $2 \times n$  or  $m \times 2$  game into a number of  $2 \times 2$  games. Every one of these sub-games is comprehended by any strategy and afterward ideal methodologies are chosen. This strategy is restricted for  $2 \times n$  or  $m \times 2$  games. For this purpose behind huge game problems it will be fall flat.





$$P_{1n} \frac{x_1}{x_{m+1}} + p_{2n} \frac{x_2}{x_{m+1}} + \dots + p_{mn} \frac{x_m}{x_{m+1}} \geq 1$$

$$\frac{x_1}{x_{m+1}} + \frac{x_2}{x_{m+1}} + \dots + \frac{x_m}{x_{m+1}} = \frac{1}{x_{m+1}}$$

Substitute  $\frac{y_j}{y_{n+1}} = Y_j$  We get for player II:

$$p_{11} Y_1 + p_{12} Y_2 + \dots + p_{1n} Y_n \leq 1$$

$$p_{21} Y_1 + p_{22} Y_2 + \dots + p_{2n} Y_n \leq 1$$

.....

(1.e)

$$P_{m1} Y_1 + p_{m2} Y_2 + \dots + p_{mn} Y_n \leq 1$$

$$Y_1 + Y_2 + \dots + Y_n = \frac{1}{Y_{n+1}}$$

Similarly Substitute  $\frac{x_j}{x_{m+1}} = x_j$  for player I:

$$p_{11} X_1 + p_{21} X_2 + \dots + p_{m1} X_m \geq 1$$

$$p_{12} X_1 + p_{22} X_2 + \dots + p_{m2} X_m \geq 1$$

.....

(1.f)

$$P_{1n} X_1 + p_{2n} X_2 + \dots + p_{mn} X_m \geq 1$$

$$X_1 + X_2 + \dots + X_m = \frac{1}{X_{m+1}}$$

Since the player II tries to maximize  $v (=Y_{n+1})$ . Thus the problem is to maximize the object function. So, introduce slack variables  $s_1, s_2, \dots, s_n$  in the first system, then we get:

Maximize:  $\frac{1}{v} = Y_1 + Y_2 + \dots + Y_n$

s/t,

$$p_{11} Y_1 + p_{12} Y_2 + \dots + p_{1n} Y_n + s_1 = 1$$

$$p_{21} Y_1 + p_{22} Y_2 + \dots + p_{2n} Y_n + s_2 = 1$$

.....

(1.g)



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