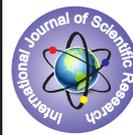


Optimization of Generalized Game value for three players with fuzzy Peramafers.



Mathematics

KEYWORDS: decision making, strategy, pay-off, crisp game value, saddle paish.

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ABSTRACT

In this paper, we analyze since strategies, players under consideration, the corresponding pay off may be fail with the range refer than diskrate values. The uncertainty in determined matrix games, we consider three players inter-valued game matrices also discussed. It may be extended further determinant games fare more players.

1.Introduction

Game theory is the study of the ways in which strategic interactions among raptorial players produces outcomes with respect to etc performance utilities of those players none of which might have been initialed by any of them. A two person game value where the player is defined as decision makes B a simplest care of game theory. Here the fundamental problem of game theory is that the player makes decisions with crisp data. In a real life world, most game always taken places in uncertain environments. Because of the uncertainty in real world applications, pay off's of a game may not be a fixed number. This situation gives the introduces of Fuzzy game. Matrix games have many useful applications, especially in decision making systems. However, in real world applications, due to certain forms of uncertainty outcomes of a matrix game may not be a fixed number even though the players do not change their strategies. By noticing the fact that the pay-off may only vary within a designated range for fixed strategies. We propose to use an interval valued matrix, whose entries are closed intervals to model such kind of uncertainty. The research on Fuzzy games has been develop by Aubin () and Butnaria []. Recently, compos [] has explored Zeno – sum Fuzzy game. In this paper we accure that the intervals in the game matrix G are closed and bounded intervals of real numbers and represent uniformly distributed possible pay offs.

2. Crisp game value of the matrix

Let us consider the game with two players A & B. The players A and B have two strategies for player A, minimum value in each row represents the least gain to him, if he choose a particular strategy. He will then soleet the strategy that maximizes his minimum gaes. For player B, the maximum value is each column represents the maximum loss to him, if he chooses has particular strategy. He will then select the strategy that minimizes his maximum loss. If there exists a g_{ij} in a classical $m \times n$ game matrix G. then g_{ij} is calted a saddle value of the game. If a matrix game has a saddle value it is said to be strictly determined. If the maximum value equals the minmax value, then the game is said to have a saddle point are the corresponding strategies are called optimum strategies. The amount of pay-off at saddle point is called the crusp value of the game. Saddle point is the minimum value of the i ----- and the maximum value of the j th column of a game.

3. Definition: Fuzzy matrix game

The elements of the game are effected by various sources of fuzziners. The gain on pay off function is not always defined numerically or sterply. It B formulated somatically and at the same time, fuzzily in such terms as excellent, good an sufficiently reliable, durable, resistant etc., The strategies employed by players are coequally marked by different levels of significance and intensity. These end other conditions account for the need to include the theory of fuzzy sets in the solution concept of the theory games.

Let $G = (g_{ij})$ be an $m \times n$ interval valued matrix. The G defines a zero sum interval matrix game produced whenever the row player uses

his i th strategy and the column player select his j th strategy, then the row player crcns and the column player losses a common $x \in g_{ij}$. Let G be on $m \times n$ interval game mafrix such that all the intervals in the same row (or column) of G are criply comparable. I there exists a $g_{ij} \in G$ such that g_{ij} is simultaneously crisply $\leq g_{ij}$, far all $K \in \{1, 2, \dots, n\}$ and crisply $\geq g_{ij}$ for all $\ell \in \{1, 2, \dots, m\}$, then the interval g_{ij} B called a saddle interval of the game. An interval game is crisply determined if it has a saddle interval.

4. Definition: Comparing intervals

In order to compare strategies and payoffs for an interval game matrix, we need to defene a notrion of interval inequality (both \leq and \geq) that corresponds to an intuitive notion of a better possible outcomes or pay off. Let x and y be two non-empty intervals. We will consider their relationship in the following cases.

(I) and $x < y$. In this case, every possible pay off value from y exceeds all of the possible pay off from x . Therefore, we say that $x < y$ and $y < x$ crisply. Which corresponds to the traditional definition of comparison used in interval computations.

(ii) $x = y$. We then define the crisp ----- $x \leq y$ and $y \leq x$ again paralleling common wage of existing interval inequality comparrison.

(iii) , we define $x \leq y$ crisply for this care as x offers no larger payoff than what is possible in y . We also define the crisp inequality $y \geq x$. Both of these comparisons also mirror existing practice in interval computing. If , we can assume that y is non-frival interval. Here we need use the width function W. As x is a proper subset y , we know that

$$W(y) - W(x) > 0.$$

The matrix game is given as follows.

	B_1	B_2	B_3
A_1	(a_1, b_1)	(a_2, b_2)	(a_3, b_3)
A_2	(a_4, b_4)	(a_5, b_5)	(a_6, b_6)
A_3	(a_7, b_7)	(a_8, b_8)	(a_9, b_9)

The players A and B have strategies (A_1, A_2) and (B_1, B_2) . In the first case, we assume the player C chooses the strategy A_1 , and in the second case be chooses A_2 , and in the third case the player chooses the strategy A_3 .

5. Numerical Example.

Now C

	B_1	B_2	B_3
A_1	(0, 1)	(6, 7)	(-2, 0)
A_2	(5, 6)	(2, 7)	(1, 3)
A_3	(-8, -5)	(-1, 0)	(-4, -2)

5.1 Minimum Interval

If the player chooses the strategy A1, then we have.

$$\begin{aligned}
 [0, 1] < [6, 7] &= 1, & [0, 1] < [-2, 0] &= 0 \\
 [0, 1] < [5, 6] &= 1, & [0, 1] < [2, 7] &= 1 \\
 [0, 1] < [1, 3] &= 1, & [0, 1] < [-8, -5] &= 0 \\
 [0, 1] < [-1, 0] &= 0, & [0, 1] < [-4, -2] &= 0 \\
 @ \text{Mini} \{1, 0, 1, 1, 1, 0, 0, 0\} &= & & 0
 \end{aligned}$$

$$\begin{aligned}
 [6, 7] < [0, 1] &= 0, & [6, 7] < [-2, 0] &= 0 \\
 [6, 7] < [1, 3] &= 0, & [6, 7] < [2, 7] &= 1 \\
 [6, 7] < [5, 6] &= 0, & [6, 7] < [-8, -5] &= 0 \\
 [6, 7] < [-1, 0] &= 0, & [6, 7] < [-4, -3] &= 0 \\
 @ \text{Mini} \{0, 0, 0, 0, 0, 0, 0, 0\} &= & & 0
 \end{aligned}$$

$$\begin{aligned}
 [-2, 0] < [0, 1] &= 1, & [-2, 0] < [6, 7] &= 1 \\
 [-2, 0] < [5, 6] &= 1, & [-2, 0] < [2, 7] &= 1 \\
 [-2, 0] < [1, 3] &= 1, & [-2, 0] < [-8, -5] &= 0 \\
 [-2, 0] < [-1, 0] &= 0, & [-2, 0] < [-4, -2] &= 0 \\
 @ \text{Mini} \{1, 1, 1, 1, 0, 0, 0, 0\} &= & & 0
 \end{aligned}$$

5.2 Maximum Interval

If the player chooses the strategy A1, then we have.

$$\begin{aligned}
 [0, 1] < [6, 7] &= 0, & [0, 1] < [-2, 0] &= 1 \\
 [0, 1] < [5, 6] &= 0, & [0, 1] < [2, 7] &= 0 \\
 [0, 1] < [1, 3] &= 0, & [0, 1] < [-8, -5] &= 1 \\
 [0, 1] < [-1, 0] &= 1, & [0, 1] < [-4, -2] &= 1 \\
 @ \text{Mini} \{0, 1, 0, 0, 0, 1, 1, 1\} &= & & 1
 \end{aligned}$$

$$\begin{aligned}
 [6, 7] < [0, 1] &= 1, & [6, 7] < [-2, 0] &= 1 \\
 [6, 7] < [5, 6] &= 1, & [6, 7] < [2, 7] &= 0 \\
 [6, 7] < [1, 3] &= 1, & [6, 7] < [-8, -5] &= 1 \\
 [6, 7] < [-1, 0] &= 1, & [6, 7] < [-4, -3] &= 1 \\
 @ \text{Mini} \{1, 1, 1, 0, 1, 1, 1, 1\} &= & & 1
 \end{aligned}$$

$$\begin{aligned}
 @ [-2, 0] < [0, 1] &= 0, & [-2, 0] < [6, 7] &= 0 \\
 [-2, 0] < [5, 6] &= 0, & [-2, 0] < [2, 7] &= 0 \\
 [-2, 0] < [1, 3] &= 0, & [-2, 0] < [-8, -5] &= 1 \\
 [-2, 0] < [-1, 0] &= 0, & [-2, 0] < [-4, -2] &= 1 \\
 @ \text{Mini} \{0, 0, 0, 0, 0, 1, 0, 1\} &= & & 1
 \end{aligned}$$

Hence $\min \{1, 1, 1\} = 1$.

This corresponds to the interval {6, 7} and {2, 7} if the third player C chooses A1, he wins. If he chooses other strategies he loses the game.

6. Conclusion:

In this paper, we have discussed three person zero sum games under determinant values. The strategies for determinant matrix games fully analyzed under fuzzily matrix games. We are analyzing three and more players different strategies based on inter valued fuzzy game. The respects of this paper can be extended to multiplayer's under determinant interval matrix method which may be useful of handling the problem of uncertainty matrix games.

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