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A Comparative Study of Fuzzy Logic towards the Motivation and Anxiety on a Sportsman

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Abstract - The aim of this article is to deduce the relationship between anxiety and motivation of a sportsman using fuzzylogic. Sports contains physiological and social dimension. The sports man is found to have full of tension, anxiety, fear and stress while participating in an event. The quality of the playing is very much depending on both physiological and as well as psychological aspects of the player. Fuzzy logic can be applied in order to find the solution to optimise their level of motivation and to overcome their level of anxiety.

Keywords- Sports, anxiety, motivation, Fuzzy logic-Minimization of regret method

I. INTRODUCTION

Sports contain both a psychological and social dimension. It means that sports are psycho-social activity full of tension, anxiety, fear and stress. Man's interest in sports is found in all societies of the world. The quality of participation of the athletes and sportsmen is determined by their psychological factors in this modern era of competition.

A. Anxiety

Anxiety plays an important role in sports. The degree of perceived anxiety is an importantvariable to be considered in the performance ofan individual. Several researches have shown that anxiety is present in all of us, including players, in varying degrees. But in the field of sports, certain situations produce more anxiety than others.

B. Motivation

Motivation explores the capacity of work of an individual. Players willingly take and confront challenges which may look undefeatable in absence of strong motivation. Mental excitements generated by the situational factors tend to favour a behaviour that most likely is the result of an effort matching the situational demand. Motivation is instrumental in ignoring negative factors that hinder performance .On the other hand it promotes emotions and explores positive avenues resulting in successful performance. The motivated person is most likely to defend his personal pride and self-image which leads to greater confidence and motivation as well.Motivation is closely related to arousal, attention, anxiety, and reinforcement. For example, a person needs to be motivated enough to pay attention while learning; anxiety can decrease our motivation to learn. Receivinga reward or feedback for an action usually increases the likelihood that the action will berepeated. Therefore, the judging and reasoning that emerge from them also become ague. In struggling to find a way of expressing succinctly the idea of vagueness in life Zadeh (1965) proposed the idea of fuzzy sets.

C. Fuzzy Logic

Fuzzy logic is an extension of Boolean logic which allows intermediate values between True and False. As in Boolean logic a true statement is expressed by the value "1" and a false statement by the value "0". However, unlike in probability theory, the value must not be interpreted as a confidence level but rather as a Membership Function (MF). Therefore, every statement is "True" to a certain degree and "False" to another. An interesting property of these MFs is that, because they vary between zero and one, they can be manipulated like probabilities; even though they are interpreted (Zétényi, 1988). The objective of this investigation is to examine association of anxiety level and motivational level of players with the help of fuzzy minimization of regret method in order to provide the diagnosis according to there the level of motivation and anxiety.

II. PRELIMINARIES

In this section, some basic definitions and results needed and notations are given:

A. Fuzzy decision making

Decision making is defined as makingchoices between future, uncertain alternatives.It is a choice between various ways ofgetting an end accomplished. Decision making plays an important role in business, finance, and economics as well as in engineering, social, physical and medical sciences. It must be emphasized that all decision making relates to the future. Where no alternatives exist, no decision making can be made.

It is a difficult process due to factors like incomplete and imprecise information vagueness and uncertainty of situation. These factors show that decisions take place in fuzzy logic environment. Decision making is characterized by choice from alternatives which are available .In this process specified goals have to be fulfilled keeping constraints in mind. Consider a simple decision making model which consists of goals and constraints. Let $\tilde{G}$ be fuzzy set defined as goal with membership function $\mu_{\tilde{G}}(x)$. And constraint described by with membership function $\mu_{\tilde{C}}(x)$ where x is an element of the crisp set of alternatives A_{alt}.By definition (Bellman and Zadeh 1970) the decision is a fuzzy set with membership function μ (x) expressed as intersection of $\tilde{G}$ and $\tilde{C}$ as follow:$\tilde{D}=\tilde{G}\cap\tilde{C}=\{(x,\mu_{\tilde{D}}(x))x\in[d_1, d_2], \mu_{\tilde{D}}(x) \in[0,h\leq 1]\}$ It is a multiple decision making resulting in selection the crisp set [d1,d2], from the set

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of alternatives Aalt ; $\mu\tilde{D}(x)$ indicates the degree to which any x∈[d1,d2] belongs to decision $\tilde{D}$ using the membership function and intersection operation formula we get $\mu\tilde{D}(x)$= min($\mu\tilde{G}(x)$, $\mu\tilde{C}(x)$), $x \in A_{alt.}$ The intersection operation is commutative. Hence $\tilde{D}$ and $\tilde{G}$can be interchanged.

Illustration
Let there are four alternatives
Aalt={1,2,3,4}
Consider goal(G) and constraint(C)
G={(1,0),(2,0.2),(3,0.4),(4,0.6)}
C={(1,1),(2,0.6),(3,0.0),(4,0.7)}
D= G∩ C
d_1={(1,min(1,0),(2,min(0.2,0.6),(3,min (0.4,0),(4,min(0.6,0.7)}
d_2={(1,0),(2,(0.2),(3,0),(4,(0.6)}

Here[d_1,d_2]={1,2,3,4}. h = 0.6, the maximizing decision isX_{max} = 4 with the highest degree of membership 0.6 in D

B. Pay off Matrix

The payoff matrix is expression of the first law of decision Science. Each row represents one action that the decision maker might or might not freely choose to perform; each column represent a possible state of nature .At the time decision must be made the decision maker assumes that one of the columns represents the actual decision situation, but her or she does not know which column is the correct one. The cells of the matrix represents payoffs that the decision maker would receive if he or he chose the action represented by a particular row and the actual state of nature were the one represent by a particular column.

III. METHODOLOGY

Decision making using minimization of regret (MMR)

Table1 Predicting The Mmr Of Hockey Players

S.No	Hockey player	Motivation	Anxiety	Minimization of regret R_i = Min{R_i}
1	Player 1	0.4	0.6	0.23
2	Player 2	0.8	0.2	0.07
3	Player 3	0.55	0.4	0.16
4	Player 4	0.3	0.7	0.27
5	Player 5	0.65	0.35	0.13
6	Player 6	0.75	0.25	0.09
7	Player 7	0.9	0.1	0.03
8	Player 8	0.85	0.15	0.05
9	Player 9	0.54	0.46	0.17
10.	Player 10	0.6	0.5	0.18

Decision making using minimization of regret was introduced by Savage and generalized by Yager by using Ordered weighted average(OWA) operator.Assume we have a decision problem in which we have collection of alternatives. {A_1…….A_n} with state of nature {S_1……..S_n}.C_{ij} is the payoff matrix to the decision maker if he selects alternative Ai and state of nature S_j. The matrix R whose components are r_{ij} is regret matrix. Main objective of the problem is to select the alternative which best satisfies the payoff to the decision maker.

IV. ALGORITHM

Step 1: Calculate the payoff matrix.
Step 2: Calculate C_{ij} = Max{C_{ij}} for eachS_j
Step 3: Calculate for each pair A_i and $S_j$$r_{ij}$ = C_j - C_{ij}
Step 4: Calculate regret matrix R_i=Max{r_{ij}} for each A_i
Step 5: Select R_1 such that R_i = Min{R_i}

V. CASE STUDY

In this study, a level of motivation and their anxiety is collectedfrom players of different groups like hockey players, athletes and boxers. The level of their motivation is being collected in a data sheet stating that their percent out of 100. The level of motivation and anxiety is being converted to the value between 0 and 1 by dividing them by 100. Example. If a player entered his level of motivation as 56, it is being converted into 0.56 by dividing by100.

Clearly,

i = set of their level of motivation
j= set of their level of anxiety
Let the level of regret is given by
R_i = Min{R_i}
R_i= *X*x 0.1+Y x 0.3+Z x 0.2+….

The minimum level of regret favors the decision in case of uncertainty.

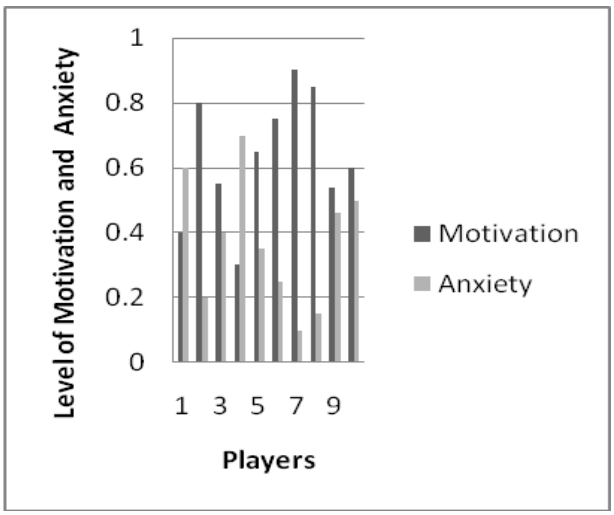

Figure : 1

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Table 2-Predicting The Mmr Of Athlete

S.No	Athlete	Motivation	Anxiety	Minimization of regret
1	Player 1	0.82	0.16	0.23
2	Player 2	0.32	0.68	0.12
3	Player 3	0.4	0.55	0.16
4	Player 4	0.9	0.2	0.21
5	Player 5	0.79	0.1	0.25
6	Player 6	0.76	0.36	0.18
7	Player 7	0.1	0.9	0.08
8	Player 8	0.78	0.35	0.18
9	Player 9	0.85	0.2	0.09
10.	Player 10	0	0.1	0.17

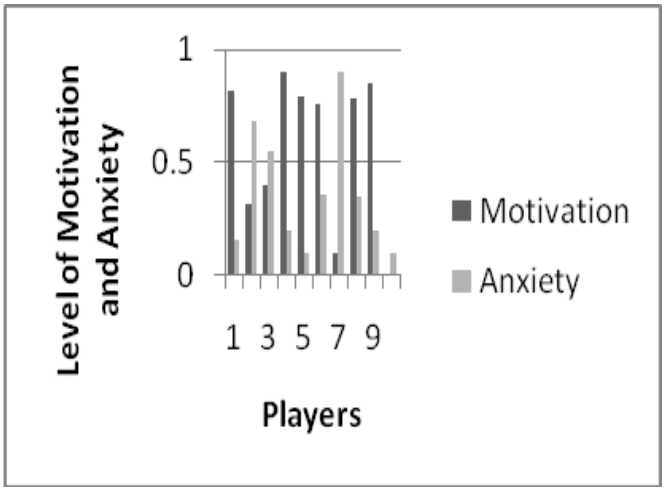

Figure 2

Table 3-Predicting The Mmr Of Boxer

S.No	Boxer	Motivation	Anxiety	Minimization of regret
1	Player 1	0.1	0.89	0.07
2	Player 2	0.64	0.48	0.14
3	Player 3	0.2	0.7	0.12
4	Player 4	0.5	0.6	0.12
5	Player 5	0.8	0.3	0.18
6	Player 6	0.46	0.54	0.14
7	Player 7	0.01	0.9	0.08
8	Player 8	0.76	0.21	0.21
9	Player 9	0.3	0.7	0.11
10.	Player 10	0.2	0.79	0.09

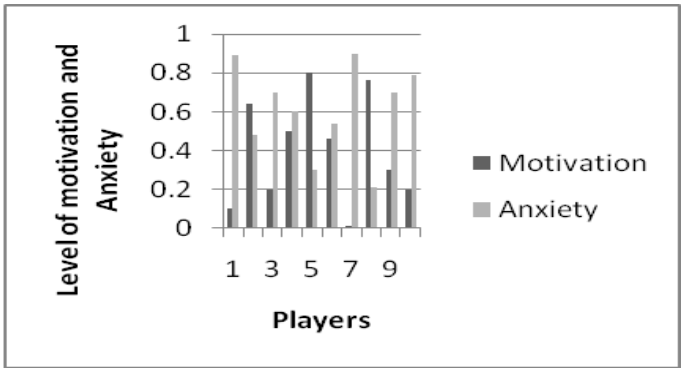

Figure :3

VI. CONCLUSION

From the table it is obvious that the minimum value of regret gives a key that it is associated with high level of motivation. Hence from this study we come to a conclusion that the fuzzy analysis using minimization of regret helps the players and also their coachers to enhance the performance of the players. Using these fuzzy minimization errors while playing and training can be minimized using their level of motivation and also helpful in their evaluation.

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