



**FUZZY FUNCTION WITH THE HELP OF FUZZY QUESTIONNAIRES AND A REAL LIFE CASE STUDY**

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**ABSTRACT**

Theory of fuzzy sets even still today is very young, but has already been applied to quite a number of research problems. In this paper, I have discussed the basic concepts such as level sets, fuzzy sets, T-norms, T-conorms, fuzzy sets operation on fuzzy sets with simple illustration. Illustration shows how to fuzzify a real problem where uncertainties exist. Here in this research paper I have define fuzzy function for :-

$G = \{\text{Set of Extremely frustrated}\} = \{\text{Farmers who are in great trouble}\}$

$M = \{\text{Set of Moderately frustrated}\} = \{\text{Farmers having moderate life style or moderate trouble}\}$

$L = \{\text{Set of Low frustrated}\} = \{\text{Farmers having minimum or less trouble}\} \dots(3)$

The case Study: My research goes deep into roots of the problems of farmers suicide based on number of factors .Suicide has cumulative causation. It occurs due to various reasons and sometimes the circumstantial evidence leads to reach conclusion but more often such inference may be wrong .Understanding the processes and situations leading to a suicidal state and its consequent influence on its decision making process is a key to understand suicide .It results from a complex interaction of Psychological ,social, cultural, financial and environmental factors

**KEYWORDS** : Fuzzy sets, Fuzzy Logic, Social Survey, Frustration measurement

**1.INTRODUCTION:**

*My research paper seeks to understand the causes of suicide through various causative factors ,for this first I made fuzzy questionnaires. Questionnaires are fundamental tools for analyzing structures of information .As the investing is more focused on farmers suicides naturally fulcrum of analysis is farm centered activities but at the same time other qualitative factors imparting suicides is to be explained in clear detail.*

*My aim is to discuss two major issues namely causes and consequence of suicide and strategies to overcome suicide ,so that this paper will be of great help to the policy makers and social scientist who are engaged in development work. Though the Major goal is of getting insight in to a social problem, I have used the survey data to illustrate how fuzzification can help in formulating the problem when many aspects do not fall under the traditional two valued logical domain.*

**2. Fuzzy Problem (Formulation):**

Identification of the universal set is the first step in formulation. We consider the following as the Universal set.

$U = \{\text{Farmers in Ghatanji, Yavatmal, Kulamb taluka}\} \dots(1)$

These are in Yavatmal district.

Farmers are all a frustrated lot. Reasons for their frustrations could be many. Most important is the fact that 'frustration' is not a two valued metric. We cannot define a logical variable which takes values

'frustration' = TRUE = 1  
or 'frustration' = FALSE = 0 ..... (2)

and not other value . Hence statement 'farmer A is frustrated'

does not fall in the traditional two-valued logic. The consequence is that we may have alternative descriptions like 'he is extremely frustrated', 'he is some what frustrated', 'he is not at all frustrated' and so on. Hence 'frustration' be comes an ideal 'metric' which can define a multi-valued logic in a real situation. It is the level of frustration that leads ultimately a person to take extreme actions like suicide.

So we define

$G = \{\text{Set of Extremely frustrated}\} = \{\text{Farmers who are in great trouble}\}$

$M = \{\text{Set of Moderately frustrated}\} = \{\text{Farmers having moderate life style or moderate trouble}\}$

$L = \{\text{Set of Low frustrated}\} = \{\text{Farmers having minimum or less trouble}\} \dots(3)$

**Consider the function**

$F: U \rightarrow [0,1] \dots\dots\dots(4)$

where U is the universal set defined in (1), F(x) for any x belonging to U is a truth value in the interval [0,1] measuring the degree of frustration of the farmer x. This metric will be used in the coming discussions do define the sets G, M and L according to the theory of fuzzy logic.

**3.Diagnostic analysis:**

I have conducted a survey, and collected responses from 30 farmers. Quantifying their level of 'frustration' which could be a cumulative effect of many 'causatives' was the primary goal. In the questionnaire distributed, attempt was made to collect information on following attributes

**Table 1: List of Attributes used in the survey form**

(1) Indebtedness.	(BV) Column
(2) Harassment for recovery of lone.	(BL) Column
(3) Crop failure.	(BJ) Column
(4) Apathy of Nationalized banks to disburse sufficient crop credit	
(5) Late and deficient monsoon and erratic distribution of rainfall(compelling double or triple sowing	(AL) Column
(6) Productivity per acre extremely low and thus net return per acre very poor	
(7) lack of irrigation facilities	(AM) Column
(8) Changing crop patterns	(AP) Column
(9) lack of allied agricultural activities and supplementary income from sectors like dairy, fisheries, poultry, sericulture districts	(O)Column
10) Price shock and poor price realization, Lack of remunerative price and Information of technology for efficient management	(AQ)Column

- 11) Psycho social factors:(a)family disorders, marriage problems of adult daughters, chronic diseases within family.
- 12) Alcoholism and prevalence of various addictions
- 13) Depression due to loss of social and economic status
- 14) Unwillingness of landed farmers for wage labour works, labour problems
- 15) Lack of benefits of different scheme (help under government scheme)

(J,K) column  
 (BT) COLUMN  
 (As)Column  
 (AX,AT)Column  
 (from column P to Ak)column

**1.Fuzzyfication:**

Now define a metric of suffering as (between 0 and 1)

- =1 If the Farmer was suffering from (1) crop failure (2)Indebtedness (3)Harassment for recovery of loan.

Or

- =.8 If the farmer was suffering from Lack of remunerative price, under the pressure of reason 11 above

Or

- =.6 Non availability of any agricultural allied activity to support his farming

- =3/4 If the reasons for suffering are "price shock"

- =.5 If the farmer was suffering from above any two reasons out of crop failure, Indebtedness or Harassment for recovery of loans

Or

- If He was suffering due to non availability or Farm Labour

- = 0 If none of the above reasons

Thus every member of the universe will have some grade suffering, a value between 0 and 1 associated with him. There has to be some relation with the grade of suffering and the tendency to commit suicide. The function  $F:U [0,1]$ , as defined in eq(4) and further exemplified in the earlier part of this section, can be evaluated using information obtained in each survey form.

I have collected from data two groups. The first group consists of farmers who received government relief the second group consists of farmer who had not received government relief there are so many aspects to study research Once such angle is as follows we know that state formulated and implemented various scheme and policy majors for upliftment of farmers in spite of these state policies still there is a problem of suicides of farmers hence we have to study whether there is any relationship between communication gap in state and farmer regarding the policy of state of giving aid to farmers through various scheme.

Now if we consider the three fuzzy set G, M, L, next thing we need to do is to classify the farmers to belong to one of these. The functions G(x), M(x), and L(x) need to be derived from F(x) which is computed from the survey form of the farmer x.

Now we define

If  $F(x) \geq 0.75$  then  $G(x) = F(x)$   
 $M(x) = 1 - F(x)$   
 $L(x) = 0$

If  $F(x) < 0.75$ , and  $\geq 0.25$  then  $G(x) = 0.75 - F(x)$   
 $M(x) = F(x)$   
 $L(x) = F(x) - 0.25$

If  $F(x) < 0.25$  then  $G(x) = 0$   
 $M(x) = F(x)$   
 $L(x) = 1 - F(x)$

**Table 2: Sample values of F(x) m G(x), M(x), L(x)**

Sr No	Farmer	F(x)	G(x)	M(x)	L(x)	Remark
1	S. H. Chavan	0.90	0.90	0.10	0.00	
2	K. M Donade	0.50	0.25	0.50	0.25	
3	P. B. Rathod	0.50	0.25	0.50	0.25	
4	A. Khiradkar	1.00	1.00	0.00	0.00	
5	Smt.H. R. Rathod	0.80	0.08	0.02	0	

6	Ghule*	0.8	0.8	0.2	0	Farmer who has strong suicidal tendency and weak moderate suicidal tendency.
7	Pawar*	0.5	0.25	0.5	0.25	Farmer belongs mainly to moderate suicidal tendency And has weak membership of high suicidal tendency and weak non suicidal tendency

\* (These are only dummy values, Use fuzzification rules to find F(x) and then use def of G, M, L to fill values in the table)

Membership function: Mathematically A Fuzzy set is the collection of ordered pairs  $A = (x, \mu(x))$ , where Item x belongs to the universe and  $\mu(x)$  is its grade membership in A. A single pair  $(x, \mu(x))$  is called fuzzy singleton. Thus the whole set can be viewed as the union of its constituent singletons. It is often convenient to think of set A just as a vector  $\mu (\mu(x_1), \mu(x_2), \dots)$  it is understood then that each position  $i, i=1,2,3,4,5,6,7,8,9, \dots, n$ ) corresponds to a point in the universe

**Operation on fuzzysets**

- (1) A is said to be contained in B, i.e  $A \subset B$  if  $A(x) \leq B(x) \forall x \in U$
- (2) The fuzzy set A B in U is called intersection of A and B if  $A \cap B(x) = \min\{A(x), B(x)\}, \forall x \in U$
- (3) The fuzzy set A B in U is called union of A and B if  $A \cup B(x) = \max\{A(x), B(x)\}, \forall x \in U$
- (4) the fuzzy set  $\sim A$  in U is called complement of A if  $\sim A(x) = (1 - A(x))$

The well known properties of sets are found true even in the case of fuzzy sets.

If A, B, C are fuzzy sets then

- (1)  $AB = BA$  and  $A \cap B = B \cap A$
- (2)  $(A \cap B) \cap C = A \cap (B \cap C)$  and  $(A \cup B) \cap C = A \cap (B \cap C)$
- (3)  $A \cap A = A$  and  $A \cup A = A$
- (4)  $(A \cap B) \cap C = (A \cap C) \cap (B \cap C)$  and  $(A \cup B) \cap C = (A \cap C) \cup (B \cap C)$
- (5)  $(A \cap B) \cup B = B$  and  $(A \cup B) \cap B = B$
- (6)  $\sim(\sim A) = A$  and  $\sim(A \cap B) = \sim A \cup \sim B$

**CONCLUSION:**

Thus we have defined fuzzy function with the help of it we are understanding causes of suicide through various causative factors

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