

# Design of Suicide Prediction System Using Intuitionistic Fuzzy Set

S. Rajaprakash, S. Muthuselvan, K. Karthik, K. Somasundaram, R. Jaichandaran

**Abstract:** Suicide is an essential issue in the Indian. In excess of one lakh (one hundred thousand) lives are lost each year in suicide in our country. Over the latest two decades, the suicide rate has extended from 7.9 to 10.3 for each 100,000. Intuitionistic fuzzy set very good output over impression data compared to the fuzzy set theory because it have a membership, non-membership and discernment information. In this proposed work based on analysis of the various factors which lead to self-destruction among people in India. It is a major area of concern because it involves livelihood of families and it affects socioeconomic status of our country. Here we identified many factors which will lead to suicide and rank them using Intuitionistic fuzzy set.

**Index Terms:** Suicide, Intuitionistic, Fuzzy sets, membership function, non-membership function.

## I. INTRODUCTION

Suicide is an important issue in the Indian setting. More than one lakh (one hundred thousand) lives are lost every year in suicide in our nation. Over the most recent two decades, the suicide rate has expanded. In India a lot of variation in the suicide rates, especially in southern region Kerala, Tamilnadu, Karnataka, and Andhra Pradesh have a suicide rate of more than 15 while in the Northern state, the suicide rate is less than 3. In India the majority of suicides are under 30 years its around 37.8% and 71% of suicide below the age of 44 years, which is huge social, emotional and economic burden in our society.

Esquirol et.al said that "All those who committed suicide are instance" and Durkheim et.al proposed that suicide was an outcome of social or societal situations. Its depend on the individual vulnerability vs social stressors in the causation of suicide has divided our thoughts on suicide. Based on the official information, the reason for suicide is not known for about 43% of suicides. But illness and family problems contribute to about 44% of suicides.

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Suicide can cause by the several reasons such as Mental illness- Anxiety, Bipolar disorder, Depression, Schizophrenia, Traumatic Experience- PTSD: Many people with PTSD or "Post-Traumatic Stress Disorder", Physical abuse, Sexual abuse, War, Bullying- Personality Disorders, Drug Addiction / Substance Abuse, Eating Disorders, Unemployment, Social Isolation / Loneliness, Relationship problems, Genetics / Family History, Philosophical Desire / Existential Crisis, Terminal Illness, Chronic Pain, Financial Problems, Prescription Drugs.

In Indian women committed suicide may be based on the following reason divorce, dowry, love affairs, illegitimate pregnancy, extra-marital affairs, conflicts relating and inability to get married, arranged marriage etc.

Intuitionistic fuzzy sets (IFS) is the generalization of fuzzy sets is. It was introduced by, Atanassov in 1983. In his work discussed about two component membership and non-membership function. The degree of membership function of an element in a given set; the nonmember ship function of degree equals to complement of membership function. The discernment value is equal to the one minus addition of member and non-membership value.

### A. Definition: Intuitionistic fuzzy set

Let  $U$  be the universe and  $A$  be the subset of  $U$  then the intuitionistic fuzzy set (IFS) is defined by  $A^* = \{ \langle x, 0 \leq \mu_A(x) + \nu_A(x) \leq 1 \rangle \mid x \in U \}$  Where  $0 \leq \mu_A(x) + \nu_A(x) \leq 1$ . The functions  $\mu_A(x): U \rightarrow [0,1]$  and  $\nu_A(x): U \rightarrow [0,1]$  represent the Membership and Non Membership functions.  $\pi(x) = 1 - \mu_A(x) + \nu_A(x)$  represent the degree of indeterminacy or hesitation degree. Where  $\pi(x): U \rightarrow [0,1]$ . Obviously every Fuzzy set has the form  $\{ \langle x, \mu_A(x), 1 - \mu_A(x) \rangle \mid x \in U \}$ .

### B. Intuitionistic Fuzzy Number- Triangular

$A(x)$  is an intuitionistic fuzzy set in  $R$  with triangular member and non member ship function as given below.

$$\mu_A(x) = \begin{cases} \frac{x-a_1}{a_2-a_1} & \text{for } a_1 \leq x \leq a_2 \\ \frac{a_3-x}{a_3-a_2} & \text{for } a_2 \leq x \leq a_3 \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

$$v_A(x) = \begin{cases} \frac{(a_2-x)}{a_2-a_1} & \text{for } a_1 \leq x \leq a_2 \\ \frac{x-a_2}{\beta} & \text{for } a_2 \leq x \leq a_3 \\ 1 & \text{otherwise} \end{cases} \quad (2)$$

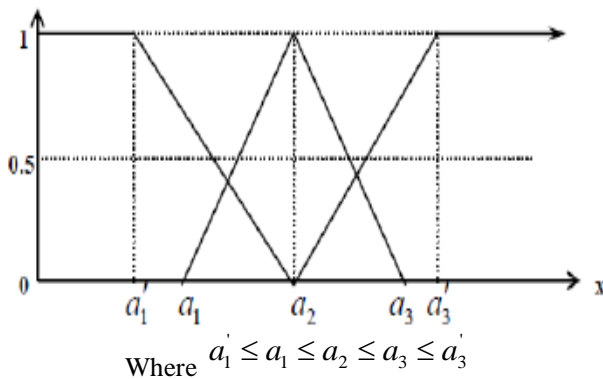


Figure 1 Triangular non membership function

C. T Intuitionistic Fuzzy Number-Trapezoidal

A Trapezoidal intuitionistic fuzzy number A(x) is an intuitionistic fuzzy set in R with membership function and nonmembership function as given below.

$$\mu_A(x) = \begin{cases} \frac{(x-a_1)}{a_2-a_1} & \text{for } a_1 \leq x \leq a_2 \\ 1 & \text{for } a_2 \leq x \leq a_3 \\ \frac{a_4-x}{a_4-a_3} & \text{for } a_3 \leq x \leq a_4 \\ 1 & \text{otherwise} \end{cases} \quad (3)$$

$$v_A(x) = \begin{cases} \frac{(a_2-x)}{a_2-a_1} & \text{for } a_1 \leq x \leq a_2 \\ 0 & \text{for } a_2 \leq x \leq a_3 \\ \frac{x-a_3}{a_4-a_3} & \text{for } a_3 \leq x \leq a_4 \\ 1 & \text{otherwise} \end{cases} \quad (4)$$

Where  $a_1 \leq a_1 \leq a_2 \leq a_3 \leq a_3 \leq a_4 \leq a_4$

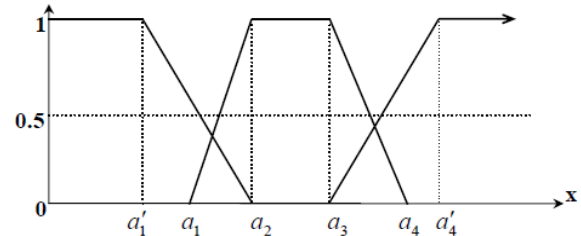


Figure 1.5 Trapezoidal membership and non membership function

II. LITERATURE SURVEY

A. Survey About the Suicide

Lakshmi Vijaykumar et al has studied about the suicide reason such as medical reason, adult, women, gender issue, media etc., and also mention about the preventing action of WHO and National plan. She suggest some points in national and international level. Devavrat Harshe et.al has studied about the celebrity suicide and how the media approaching etc.,[1]

Donald Shepard et.al has been studied about the suicide attempts in the United States of America. He identified many categories and factors. In his study he discussed about fatal self-inflicted injury and classified into ages wise. Rajiv Radhakrishnan et.al has studied about leading cause of death among young adults worldwide. In his work, mention about the review explores the historical, epidemiological and demographic factors [2]

Ashish Srivastava et. al has been studied for the people residing in Goa, India of their socio-demographic and Psychological attributes from the hundred victim profile. Most part of suicide exploited people had not earned larger amounts of training. It's determined that in about six years' suicide populace, dominant part of suicide unfortunate casualties had not earned larger amounts of instruction. Be that as it may, half-hour had instruction higher than essential dimension and scarcely V-day had higher educating or a ton of. Inside the investigation test, seventy eight of unfortunate casualties had instruction however tenth standard. Château (2004) [20] concurring that exclusively psychological militant association of suicide completers had considered up to class level. People having instructive movement presumably have higher stress-handling and adapt abilities. There's in them generally higher-developed interpersonal organization and that they have better data of and access to human services. In this way, arrangement of upper instruction could cut down the expanding assortment of suicides inside the state [3].

B. Survey in Intuitionistic Fuzzy Set

The perception of intuitionistic fuzzy units (ifs) as a generalization of fuzzy units turned into introduced by using Atanassov within the 12 months of 1986 [4]. The writer brought the non-membership function in fuzzy set.

In the year 1996, P. Burillo et al. has been studied about theorem in intuitionistic fuzzy set, the concept which permits to construct an intuitionistic fuzzy set from two fuzzy sets. The authors also discussed about the recover the fuzzy units used within the construction from the intuitionistic fuzzy sets [5]. The new definition of distance between intuitionistic fuzzy sets apart from that Atanassov studied by way of Eulaliaszmidt et al in 2000 [6].

Intuitionistic fuzzy pair, intuitionistic fuzzy couple, intuitionistic fuzzy value has been studied with the aid of Krassimir Atanassov et al. In 2013 [7]. Intuitionistic fuzzy delphi technique used as forecasting device based totally on professional's notion. They used triangular fuzzy range are used and aggregation system based on the opinion of the expert proposed by Tapan Kumar et al. In 2012. [8] The belief of intuitionistic fuzzy t-norm and t-conorm is as determined in 2002 with the aid of Deschrijver et al. In 2007 Xu suggest the intuitionistic fuzzy triangular norms [9]. The use of the intuitionistic fuzzy sets as a device diagnosis of disease d primarily based on the signs and symptoms s became studied with the aid of Eulaliaszmidt et al in 2001 [10]. In this work the author used set of signs and symptoms as a database.

In 2016 S. Rajaprakash et al. proposed a version to rank the factors in enterprise scorecard the use of intuitionistic fuzzy analytical hierarchy procedure in sheet metal automotive industry [11]. A non-probabilistic kind entropy measure for intuitionistic fuzzy set was proposed by Eulalia et al. (2000) and in this work the degree is constant with regular fuzzy units [21]. Socio metric questionnaire has been developed to discover of the social status of a student in a school class the use of the intuitionistic fuzzy set has been studied by means of Magdalena Rencova in 2009 [13].

Using the intuitionistic fuzzy good judgment advanced a intuitionistic fuzzy gadget to control the heater enthusiasts. On this work the velocity of the heater fan is calculated using intuitionistic fuzzy guidelines carried out in an inference engine the usage of Defuzzification technique by way of Muhammanakram et al. In 2013 [15]. The remotely sensed picture where distinctive varieties of regions are extracted the use of intuitionistic fuzzy set theory observe by way of Tamalikachaira (2010) [20]. In his work the writer as compared with fuzzy and non-fuzzy approach, the brand new extracted image the use of ifs were better given that of the hesitation diploma. Rajaprakash et. al has proposed a model the use of intuitionistic fuzzy set over purchaser pride in vehicle industry in 2014 [16]. Chris Cornelis et al. Made an strive for implementation of intuitionistic fuzzy set theory and 2d is c program Language period-valued fuzzy set concept. Tracing those fashions one cease keep up with a vital subculture of algebraic structures for developing logical and the use of the lattice that they define on and the other hand to reveal in a clear manner the 2 models formal equivalence. Using the classical and fuzzy implication to initiate a category framework for the resulting operators based totally on extra logical standards. Subsequently the authors giving both tactics as models of imprecision and observe them in a sensible context [17].

Vibrant Jose, sunny Kuriakose proposed a technique of

solving multi-attribute selection making issues in intuitionistic fuzzy environment. Additionally, they introduced an optimization version to estimate the relative degree of importance of club, non-club and hesitation and rectifying the drawbacks in the accuracy function given via Zhi Pei and Li Zheng [18]. Using the intuitionistic fuzzy set determine the student expected overall performance became have a look at with the aid of G. Vasanthi in the year of 2015 and in her work the usage of normalized Euclidean distance method by measuring the distance among each student and each situation overall performance respectively [19].

### C. Limitation in past work

Among the authors and magazine discussed about the purpose of suicide and idea of prevention approach. Many factors are diagnosed so that you can result in suicide via many authors. However none of them ranked the factors primarily based at the environments, survey etc.

## III. METHODOLOGY

Stage 1: questionnaires are framed based on experts' suggestion. Here our experts are doctors, psychiatrist and counselors.

Based on the survey of questionnaires mean convert the value into member and non membership values.

Stage 2: Comparison Matrix

After fixing the values from stage-1, the comparison matrix is framed.

Stage 3: Intuitionistic Relation

According to Xu et al. the consistent interval fuzzy preference relations are follows.

$R = (M_{ik})_{n \times n}$  with  $M_{ik} = (\mu_{ik}, \nu_{ik})$  ( $i, k = 1, 2, 3, \dots, n$ ) is multiplicative consistent if

$$\mu_{ik} = \begin{cases} 0, & \text{if } (\mu_{ii}, \mu_{kk}) \in \{(0,1), (1,0)\} \\ \frac{\mu_{ii}\mu_{kk}}{\mu_{ii}, \mu_{kk} + (1-\mu_{ii})(1-\mu_{kk})}, & \text{otherwise} \end{cases} \quad (3.1)$$

$$\nu_{ik} = \begin{cases} 0, & \text{if } (\nu_{ii}, \nu_{kk}) \in \{(0,1), (1,0)\} \\ \frac{\nu_{ii}\nu_{kk}}{\nu_{ii}, \nu_{kk} + (1-\nu_{ii})(1-\nu_{kk})}, & \text{otherwise} \end{cases}$$

Xia and Xu et al have proved the intuitionistic relation.

In the fuzzy preference relation the following statement are equivalent (Xe et al):

$$b_{ik} = \frac{\sqrt[n]{\prod_{s=1}^n b_{is}b_{sk}}}{\sqrt[n]{\prod_{s=1}^n b_{is}b_{sk}} + \sqrt[n]{\prod_{s=1}^n (1-b_{is})(1-b_{sk})}} \quad i, k = 1, 2, 3, \dots, n$$

(3.2)

Based on the above result and theorem of Zeshuri Xu et al, we can have the following formula.

For  $k > i+1$ , and let  $\bar{M}_{ik} = (\bar{\mu}_{ik}, \bar{\nu}_{ik})$

$$\bar{\mu}_{ik} = \frac{\sqrt[k-i-1]{\prod_{t=i+1}^{k-1} \mu_{it} \mu_{tk}}}{\sqrt[k-i-1]{\prod_{t=i+1}^{k-1} \mu_{it} \mu_{tk} + \sqrt[k-i-1]{\prod_{t=i+1}^{k-1} (1-\mu_{it})(1-\mu_{tk})}}} \quad k > i+1 \quad (3.3)$$

$$\bar{\nu}_{ik} = \frac{\sqrt[k-i-1]{\prod_{t=i+1}^{k-1} \nu_{it} \nu_{tk}}}{\sqrt[k-i-1]{\prod_{t=i+1}^{k-1} \nu_{it} \nu_{tk} + \sqrt[k-i-1]{\prod_{t=i+1}^{k-1} (1-\nu_{it})(1-\nu_{tk})}}} \quad k > i+1 \quad (3.4)$$

And for  $k= i+1$  let  $\bar{M}_{ik} = M_{ik}$  and  $k < i$  let  $\bar{M}_{ik} = (\bar{\nu}_{ki}, \bar{\mu}_{ki})$

Multiplicative consistent intuitionistic relation is obtained from the above Equations, the lower triangular elements of the matrix.

Stage-4: Consistence of data

The distance between intuitionistic fuzzy relations [xu et.al] is calculated by the formula.

$$d(\bar{M}, M) = \frac{1}{2(n-1)(n-2)} \sum_{i=1}^n \sum_{k=1}^n (|\bar{\mu}_{ik} - \mu_{ik}| + |\bar{\nu}_{ik} - \nu_{ik}| + |\bar{\pi}_{ik} - \pi_{ik}|) \quad (3.5)$$

$$d(\bar{M}, M) < \tau \quad (3.6)$$

If the Equation (3.6) then the relation matrix is consistent in the intuitionistic relation. Here the threshold is  $\tau$ . If the Equation (3.6) is not satisfied then intuitionistic preference relation is not consistent then go to the stage1

Stage-5: weight calculation

The priority of the intuitionistic preference relation (zeshuriXu) is calculated by using the following.

$$w_i = \frac{\sum_{k=1}^n M_{ik}^1}{\sum_{i=1}^n \sum_{k=1}^n M_{ik}^1} = \frac{\sum_{k=1}^n [\mu_{ik}, 1-\nu_{ik}]}{\sum_{i=1}^n \sum_{k=1}^n [\mu_{ik}, 1-\nu_{ik}]}$$

$$w_i = \left( \frac{\sum_{k=1}^n [\mu_{ik}]}{\sum_{i=1}^n \sum_{k=1}^n [1-\nu_{ik}]} , 1 - \frac{\sum_{k=1}^n [1-\nu_{ik}]}{\sum_{i=1}^n \sum_{k=1}^n [\mu_{ik}]} \right) \quad (3.7)$$

According to the Szmidt and Kacprzyk a function in mathematical form

$$\rho(\alpha) = 0.5(1 + \pi_{\alpha})(1 + \mu_{\alpha}) \quad (3.8)$$

Step-6: Preference calculation

After calculating the weight of the Equation (3.8) the value  $\rho(\alpha)$  is calculated by using the above Equation (3.8). Then, based on the  $\rho(\alpha)$  value one can easily order the preference (Rank) attributes.

Based on the suggestion from experts the attributes are categorized and make them into hierarchy order which is given below as Table-1

Table-1 Hierarchy order

Factors for Suicide			
Level-1	Level-2	Level-3	Level-4
<b>Education</b>	<b>Personal</b>	<b>Medical</b>	<b>Women</b>
Complex	Love affairs	Adjustment disorder	Divorce
Studies	Family situations	Anorexia nervosa	Dowry

Language	Drugs Addict	bipolar disorder	Love affairs,
Exam failures	Financial issues	Body Dysmorphic Disorder	Illegitimate Pregnancy
Bullying and ragging	Self-obsession	Borderline Personality Disorder	Extra-marital Affairs
Fees payment	Education Failure	Dissociative identity disorder	Conflicts relating
Exam results	Work stress	Gender dysphoria, or gender identity disorder	Inability to get Married
Home sick	Divorce	Major depressive disorder	Arranged marriage
Ragging	Infertility	Panic disorder	Hormone imbalance
Love affairs	Gender issues	Post-Traumatic Stress Disorder (PTSD)	Infertility treatment
Physical problem	Health issues	Schizophrenia	Child marriage
In ability		Social anxiety disorder	Office environment (if working)
Friends		Generalized anxiety disorder	
drugs		Substance abuse	
		Exposure to suicidal behavior in others	

Where R1 – Love affairs; R2 – Family situations; R3 – Drugs Addict; R4 – Financial issues; R5 – Self-obsession; R6 – Education Failure; R7 – Work stress; R8 – Divorce; R9 – Infertility; R10 – Gender issues; R11 – Health issues

In the level-2 according to the experts' suggestion the Quality has been classified into eight attributes which are denoted by R1 ,R2 ,R3 ,R4 ,R5,R6,R7,R7,R8, R9, R10, R11 representing Financial issue, Family situations, Infertility, Drugs addicts, Health issue, Education failure, Gender issue, Love affairs, Work stress, divorce, Self-obsession respectively. As before in level-1 the initial values are validated by the Delphi method by various iteration the matrix M (Table-2) are framed which is given below.

The above matrix is consistent because the distance between intuitionistic relation is calculated using the equation (3.5), giving  $\rho(\alpha) = 0.085004$  which is less than 0.1 .

The next step is calculating the weight of all attributes using the equation (3.7).

To make the ranking of attributes by using the above weights equation (3.8) calculated and based the value preference are allocated for the attributes (Table-5).



Table -2: Comparison Matrix

M	R1		R2		R3		R4		R5		R6		R7		R8		R9		R10		R11	
	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$
R1	0.5	0.5	0.5	0.5	0.6	0.3	0.4	0.5	0.5	0.4	0.6	0.4	0.5	0.4	0.6	0.3	0.6	0.3	0.5	0.5	0.5	0.4
R2	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.3	0.5	0.5	0.5	0	0.4	0.5	0.5	0.7	0.1	0.8	0.5	0.5	0.5	0.5
R3	0.5	0.5	0.4	0.5	0.5	0.5	0.4	0.5	0.4	0.5	0.5	0.3	0.5	0.5	0.6	0.3	0.2	0.6	0.4	0.5	0.4	0.6
R4	0.5	0.4	0.5	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.3	0.5	0.3	0.7	0.5	0.5	0.5	0.5
R5	0.5	0.4	0.5	0.4	0.5	0.4	0.5	0.4	0.5	0.5	0.3	0.6	0.3	0.6	0.4	0.5	0.4	0.5	0.5	0.5	0.5	0.5
R6	0.6	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.3	0.5	0.5	0.5	0.3	0.4	0.5	0.3	0.7	0.4	0.5	0.5	0.5
R7	0.4	0.5	0.5	0.4	0.5	0.5	0.6	0.3	0.6	0.3	0.5	0.4	0.5	0.5	0.5	0.4	0.4	0.6	0.5	0.5	0.2	0.8
R8	0.5	0.5	0.7	0.5	0.5	0.3	0.6	0.3	0.5	0.4	0.7	0.3	0.5	0.4	0.5	0.5	0.4	0.6	0.4	0.6	0.4	0.5
R9	0.8	0.2	0.8	0.1	0.8	0.2	0.7	0.3	0.5	0.4	0.7	0.3	0.6	0.4	0.6	0.4	0.5	0.5	0.5	0.5	0.5	0.5
R10	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.6	0.4	0.5	0.5	0.5	0.5	0.5	0.5
R11	0.5	0.4	0.5	0.5	0.6	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.2	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5

Multiplicative fuzzy relation matrix (M) is calculated by using the equation (3.1)

Table-3 Multiplicative Intuitionistic Fuzzy Matrix

$\bar{M}$	R1		R2		R3		R4		R5		R6		R7		R8		R9		R10		R11	
	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$	$\mu$	$\nu$
R1	0.5000	0.5000	0.5000	0.5000	0.5000	0.4495	0.5000	0.3483	0.4000	0.3956	0.3956	0.0000	0.4807	0.3310	0.3956	0.2627	0.0274	0.1827	0.5000	0.1576	0.3022	0.1913
R2	0.5000	0.5000	0.5000	0.5000	0.5000	0.4000	0.5000	0.3483	0.4000	0.5000	0.3956	0.3000	0.3956	0.0000	0.3038	0.0000	0.0870	0.0000	0.2779	0.0000	0.0832	0.0000
R3	0.4495	0.5000	0.4000	0.5000	0.5000	0.5000	0.4000	0.5000	0.5000	0.5000	0.4000	0.5000	0.3483	0.4450	0.2627	0.4495	0.1600	0.6962	0.1892	0.6517	0.1250	0.7534
R4	0.3483	0.5000	0.3483	0.5000	0.5000	0.4000	0.5000	0.5000	0.4000	0.5000	0.3483	0.5505	0.3483	0.4450	0.3525	0.4495	0.1600	0.6962	0.1892	0.6517	0.1250	0.7534
R5	0.3956	0.4000	0.5000	0.4000	0.5000	0.5000	0.5000	0.4000	0.5000	0.5000	0.5000	0.5000	0.3956	0.4450	0.3000	0.6000	0.1325	0.7746	0.1600	0.6475	0.1045	0.7500
R6	0.0000	0.3956	0.3000	0.3956	0.5000	0.4000	0.3483	0.5505	0.5000	0.5000	0.5000	0.5000	0.5000	0.3000	0.5000	0.3483	0.3525	0.4955	0.3038	0.5505	0.1512	0.6667
R7	0.3310	0.4807	0.0000	0.3956	0.3483	0.4450	0.4450	0.3483	0.4450	0.3956	0.5000	0.4000	0.5000	0.5000	0.5000	0.4000	0.4495	0.5000	0.4495	0.5505	0.4000	0.5000
R8	0.2627	0.3956	0.0000	0.3038	0.4495	0.2627	0.4495	0.3525	0.3000	0.6000	0.3483	0.5000	0.5000	0.4000	0.5000	0.5000	0.4000	0.6000	0.4495	0.5505	0.4000	0.6000
R9	0.1827	0.0274	0.0000	0.0870	0.6962	0.1600	0.6962	0.1600	0.7746	0.1325	0.4955	0.3525	0.5000	0.4495	0.6000	0.4000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000
R10	0.1576	0.5000	0.0000	0.2779	0.6517	0.1892	0.6517	0.1892	0.6475	0.1600	0.5505	0.3038	0.5505	0.4495	0.5505	0.4495	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000
R11	0.1913	0.3022	0.0000	0.0832	0.7534	0.1250	0.7534	0.1250	0.7500	0.1045	0.6667	0.1512	0.5000	0.4000	0.6000	0.4000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000

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**Table-4**

Weight	$\mu$	$\nu$
W(R1)	0.08309514	0.79856
W(R2)	0.06990037	0.7773199
W(R3)	0.06378582	0.8501181
W(R4)	0.05774428	0.8488012
W(R5)	0.06061895	0.847571
W(R6)	0.05778793	0.8293628
W(R7)	0.06089564	0.8354442
W(R8)	0.05449421	0.8367565
w(R9)	0.07062523	0.7942782
w(R10)	0.13006461	0.8142415
W(R11)	0.13449235	0.7922085

**Table 5- Preference**

Attribute	$\rho(\alpha)$	Preference
Infertility (R9)	0.9251	1
Drugs/alcohol (R3)	0.9245	2
Health issue (R11)	0.9238	3
Love affairs (R1)	0.9184	4
Gender issue (R10)	0.9178	5
Education failure (R6)	0.9147	6
divorce (R8)	0.9072	7
Financial issue (R4)	0.8993	8
Work stress (R7)	0.8972	9
Self-obsession (R5)	0.8962	10
Family situations (R2)	0.8887	11

## IV. RESULTS AND DISCUSSION

In the level –2 eleven attributes are identified. Based on the expert suggestion comparison question are framed. From the input of survey first comparison matrix M (Table-2) are framed using the equation 1.1 and 1.2. To check the data consistent Table-3 are framed from the equation 3.3 and 3.4. Finally weight of the attribute are calculated from the equation 3.8. Observation from the Table-5 infertility will have most impact, Drugs /alcohol and Health issue ranked as second and third reasons. Love affairs ranked as fourth, gender issue in 5th position. Education, divorce, financial issue, work stress, self-obsession, sixth, seven, eight, nine and tenth position respectively. Finally family situations have less impact. Similarly in level-1 Education have 13 attributes , in level -3 have 14 attributes and in level-4 women category have 11 attributes are ranked based on the above methodology.

## V. CONCLUSION

In India suicides have main impact of the nation especially in young attempting suicide is very high due to the many reasons. In this work an attempt is made and identified reason of suicide and ranked them using the intuitionistic

fuzzy set because it will give better output over impression information. Further, this work can be extended to increase the attributes for the better output. Based on the preference of the attributes can take further action for the affected person to reduce the suicide rate in India.

## REFERENCES

- Lakshmi Vijaykumar, "Suicide and its prevention: The urgent need in India", Indian J Psychiatry 49(2), Apr-Jun 2007.
- Donald s. Shepard, Deborah Gurewicz, aung k. Lwin, Gerald A. Reed, Morton M. Silverman, "Suicide and Suicidal Attempts in the United States: Costs and Policy Implications", Wiley Periodicals, Inc. on behalf of American Association of Suicidology DOI: 10.1111/sltb.12225, June 2016
- Ashish Srivastava," Psychological attributes and socio-demographic profile of hundred completed suicide victims in the state of Goa, India", Indian Journal of Psychiatry 55(3), Jul-Sep 2013.
- Atanassov, K.T (1986) "Intuitionistic fuzzy sets" Fuzzy Sets Syst. 20(1)-springer 87-96.
- BurilloH.Bustince(1996) "Construction theorems for intuitionistic fuzzy sets" Volume 84, Issue 3, Pages 271-281.
- Szmidt, E., Kacprzyk, J. (2000) "Distances between intuitionistic fuzzy sets". Fuzzy Sets Syst. 114(3), 505-518.
- Atanassov, K., Szmidt, E., Kacprzyk, J.(2013) "On intuitionistic fuzzy pairs". Notes on Intuitionistic Fuzzy Sets 19(3), 1-13.
- Tapan Kumar Roy, A.G(2012) "Intuitionistic fuzzy delphi method: More realistic and interactive forecasting tool". Notes on Intuitionistic Fuzzy Sets 18(50) (2012) 37-50.
- Deschrijver G, Cornelis, C.,Kerre, E (2002) "On the representation of intuitionistic fuzzy norms and t-norms". Notes on Intuitionistic Fuzzy Sets 8(3), 1-10.
- EulaliaSzmidt and JanuszKacprzyk (2001) " Intuitionistic Fuzzy Sets in Some Medical Applications"- Fifth Int. Conf. on IFSs, Soa, 22-23 Sept. 2001 NIFS 7- 4, 58-64.
- S.Rajaprakash , R.Ponnusamy " Ranking Business Scorecard Factor using Intuitionistic fuzzy analytical hierarchy process with fuzzy Delpi Method in Automobile Sector" Lecture Notes in Computer Science book series (LNCS, volume 9468),2016.
- Abdullah, L., Jaafar, S., Imran (2013) "Intuitionistic fuzzy analytic hierarchy process approach in ranking of human capital indicator" Journal of Applied Science 3(1), 423-429 (2013).
- Sadiq, R., Tesfamariam, S(2009) "Environmental decision-making under uncertainty using intuitionistic fuzzy analytic hierarchy process (IF-AHP). Stochastic Environmental. search and Risk Assessment" springer 75-91.
- Xu, Z (2007) "Intuitionistic preference relations and their application in group decision making". Inf. Sci. 177(11), 2363-2379.
- MuhammanAkram, M., Shahzad, S., Butt, A., Khaliq, A.(2013) " Intuitionistic fuzzy logic control for Heater fans". Mathematics in Computer Science 7(3) 367-378.
- S.Rajaprakash, R.Ponnusamy , J.Pandurangan "Determining the Customer Satisfaction in Automobile Sector Using the Intuitionistic Fuzzy Analytical Hierarchy Process" MIKE 2014, LNAI 8891, pp. 239-255, 2014.© Springer International Publishing Switzerland 2014.
- Chris Cornelis GladDeschrijver, Etienne E. Kerre (2004) "Implication in intuitionistic fuzzy and interval-valued fuzzy set theory:construction, classification,application" International Journal of Approximate Reasoning 35 , 55-95.
- Shiny Jose, Sunny Kuriakose (2013) "Note on multiattribute decision making in intuitionistic fuzzy context" Notes on Intuitionistic Fuzzy Sets Vol. 19, 2013, No. 1, 48-53.
- Dr. G.Vasanti and T.Viswanadham (2015) " Intuitionistic Fuzzy Set and Its Application in Student Performance Determination of a Course via Normalized Euclidean Distance Method"- International Journal of Multidisciplinary and Scientific Emerging Research- Vol.4, No.1.
- Tamalikachaira(2010) "Intuitionistic fuzzy set approach for color region extraction" – Journal of scientific & Industrial Research Vol.69, pp 426-432



21. EulaliaSzmidt (2001) "Entropy for intuitionistic fuzzy sets" - Fuzzy Sets and Systems 118 467-477.

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