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A NEW FUZZY MODEL FOR DETERMINING HAPPINESS LEVEL AT THE INDIVIDUAL LEVEL

Abstract: *Determining the overall happiness index at the individual level is based on the new fuzzy model which is proposed in this paper. The uncertainties into the relative importance of the happiness variable and their values are modelled by using fuzzy sets theory. The relative importance of each happiness variable is obtained by using fuzzy averaging method. Classification of selected variable is performed by using ABC method. The weights of happiness variable are determined by expert team. The happiness level at the individual level is determined by using fuzzy if-than rules. The proposed model is illustrated by real life data.*
Keywords: *happiness level, fuzzy sets, fuzzy logic*

1. INTRODUCTION

In contemporary literature, the term happiness is interpreted in different ways, in the broadest sense means that which makes life good. Happiness in the literature is often used as a synonym for the term well-being and quality of life, in which applies equally to individual and social well-being [1]. Happiness is usually defined on the basis of empirical research-consumption directly assessed their happiness, and balance that exists between the positive and negative impacts on the bottom of their happiness over a longer period of time [2]. Assessment of happiness of the individual, which is based on the use of this definition has many drawbacks. One of the main disadvantages is that the happiness of the individual, is defined exclusively on his report.

Sheldon and Lyubomirsky [3] defined the term current level of happiness. They define happiness as a phenomenon that is not related to the daily level but for a longer period of time (at least 2, 6 or 12 months).

At the level of happiness is influenced by many factors. Some researchers believe that two factors have the greatest impact on the level of happiness: (1) cultural values and (2) Social networking and communication. The research results, which were implemented in the countries of Western and Eastern Europe show that there is a strong negative correlation between individual satisfaction and wealth (about 0.65), strong Government (around 0.62) and safety (about 0.4). Positive correlation that is greater than 0.4 exists between individual satisfaction and the following factors: understanding, pleasant time spent, caring and Interest will co-worker, creativity, loyalty and pleasing events that occur on the job. The most important social factor in the countries in which the individual satisfaction is high church (over 20%), followed by sports (around 15%), cultural activities (over 10%). The least influential factor that is designated as Human Rights (less than 5%) and the absence of war events (about 5%).

The use of different statistical methods (analog, [4]) showed that happiness can be seen as a change of positive and negative phase challenging fluctuating happiness. In other words, the individual's happiness depends not only on his personality but also on the circumstances. The experiment in [5] has shown that happiness at the individual level can vary not only over a long period, but also during the day. The literature can be found a large number of works which used different questionnaires and different scale to estimate happiness on the individual level using [4, 6].

In the literature we can find some papers that meet certain level in an exact manner. It is known that possible measuring of any size can initiate lead to the improvement.

The main motive of the author is to develop a model to determine the level of happiness at the individual level in an exact manner. Factors that affect the happiness of

individual can hardly be measured. Determination of value and the relative importance of the factors influencing the level of happiness is based on an estimate of experts from research considered domain. The experts based their assessment on knowledge, current information, records data, experience, etc. It is known that expert much easier, simpler and therefore more accurate estimates and reports using linguistic expressions. Modelling of linguistic experience is based on fuzzy sets theory [7, 1].

The paper is organized as follows: a review of literature is presented in chapter 2. The third chapter is a data item problem. Modelling uncertainties is outlined in Section4. Proposed algorithm is shown in Section 5. In Section 6 provides an example that illustrates the developed method. Conclusions are presented in Section 7.

2. LITERATURE REVIEW

A In the literature there are a number of methods developed to assess the level of happiness of the individual. Furthermore, as summarized some of the most widely used method. Gross national income (GDP). Eighties is defined gross domestic product-GDP as an indicator for the well-being of the population of each country. In recent decades, GDP includes: diversity, living costs and expenses due to adverse events, and the value of volunteer work. Index of Sustainable Economic Welfare (ISEW). Calculating the value of this index is based on a consideration of the costs that arise due to different environmental extreme situations such as pollution or environmental destruction. Measure of Domestic Progress (MDP). This methodology has been developed on assumptions of previous methodologies that take into account climate change and the depletion of natural resources. The Human Development Index (HDI). HDI has three components: (1) GDP, which is the basis for determining the standard of living, (2) life expectancy at birth, and (3) knowledge that is obtained through the education system. The Happily Planet Index (HPI). HPI is a new measure of human satisfaction and development. Compared with previous indices, HPI is multidimensional. HPI is composed of a number of different variables, so that every variable reflecting different aspects of the human condition. It can be said that the HPI is composed of three indices: (a) Individual satisfaction, (b) Life expectancy-dependent genetic predisposition and living conditions, and (c) The impact on the environment-is measured by the amount of food consumed, the level of pollution of air, water and soil. The first two indices are proportional to a third inversely proportional influence on the value of the HPI. According to the developed methodology, the highest HPI could be 83.5. Worldwide studies have been realized on the basis of which the calculated value of the HPI index. Treatment of the obtained results it can bring following conclusions: (a) The highest value of the HPI are residents of Malta (53.3), which represents 64% of the maximum value of the HPI. The lowest value of US residents (28.8). (B) In Europe and the US, 46% considered the state has the HPI, which is less than 50% of the maximum value of the HPI. (C) In Africa, 31% of the country has HPI less than 50% of the maximum value of the HPI. (D) all considered Asian countries, the Caribbean and the Western Pacific and South American Countries May HPI greater than 41.75. The largest US GDP has, or is on the 150th place among all countries according to the HPI. The concept of subjective satisfaction (SWB) is developed in the literature. Measurement of SWB is obtained by forecasting, correlation and effect. In a study [8] developed a method OHQ (Oxfored Questionnaire Happiness), which represents an improved method of SWB. The author has defined a set of 29 sentences, which should describe the feeling of happiness of the individual in different domains. Sheldon and Lyubomirsky [3] have defined a model for the assessment of happiness has three components: (1) A set of objectives (50%), (2) Foreign activity (about 40%), and (3) Circumstances (about 10%). Collection of targetsis considered to be a set of goals that is constant over time. Based on expirance it is hard to determine that this factor has positive influence in cases where influence of other two factors can be ignored. In mathematical terms, this factor can be treated as a constant member in the polynomial of degree N. Intended activities can be defined as hard work in which the individual is involved. The main limitation of this model is that it cannot establish the exact relationship between the change in circumstances and changes in activity.

Linley et al [9] suggest that there are two

main factors that affect happiness: (1) personally or individual satisfaction and (2) psychological satisfaction. Individual satisfaction consists of a compromise between positive and negative emotions and cognitive component, which provides an assessment of how much an individual, is satisfied in life. Components of the psychological satisfaction are: (1) independence, (2) life skills, (3) continuous development of a person, (4) positive relations with others, (5) the purpose of life, and (6) self-acceptance. To assess the value of each factor and its sub-factors are used to measure a predefined scale. Negative emotions and positive that represent individual sub-factors of satisfaction are assessed on a scale of 1-20 rate. Life satisfaction was assessed on a scale rate of 1 to 7. A value of 1 indicates that the participant in the survey disagreed with the response offered a value of 7 to completely agree. All components of psychological satisfaction were evaluated on a scale measure which has six levels. A value of 1 means strict disagree a value of 6 is strictly stacking. The application of factor analysis was obtained by the impact of each factor considered in the sub-factors.

Mollinger et al, [10] used the computer and empirical methods to investigate the meaning of happiness. Further studies are presented and the results obtained in each of the reviewed studies, separately.

STUDY 1

In this study, the goal was to be closer to explain the meaning of happy emotions using tests that occur in individuals when it comes to happiness.

STUDY 2.

This study involved people from 18-78 years of age. They have a term I am very happy described using a Likert scale measures. So to 1 indicates that the participant surveys absolutely disagrees with the sentence stated above, a value of 7 to respondent completely agrees. Rating scales of happiness through rate [5] is based on the assumption that happiness is associated with the structure of personality. Based on the results obtained using the model developed in [5] it can be concluded that the characteristics of personality: the sustainability of attitudes of individuals over time.

Application of different sampling methods (statistical methods) (analogical [5]) showed that happiness can be seen as a change of positive and negative phase which challenges fluctuating happiness. In other words, the individual's happiness depends not only on his personality but also on the circumstances. The experiment shows that happiness at the individual level can vary not only over a long period, but also during the day. Scale rate used in the experimental method can include fluctuations in the level of happiness. By using this method can be determined empirically satisfaction. The application of traditional methods can be assessed satisfaction.

The model developed in this paper is based on a model shown in [8] Comparing the proposed model and the model for assessing Kyi happiness can be found in the literature can notice certain differences which are also the priority of the model. In all models, are considered to be factors affecting the happiness of the individual have the same relative importance. The values of the factors of happiness were estimated at a predetermined rate scale. Factors happiness can be benefit and cost nature. In the analysed works, this fact was not taken into account in determining the overall level of happiness of the individual.

2. PROBLEM STATEMENT

Step 1. Variables are defined fortunate to work [8]. Formally, these variables can be set performance index $\zeta = \{1, ..., i, ..., I\}$. Summarized number of variables is labeled. Index variable is labeled as i , i = 1, .., I.

Step 2. Relative importance of happiness variables is different. The classification criterion is defined as the aggregate value of the relative importance of hapiness variable.

Step 3. Tim of experts are represented by set of indices $\varepsilon = \{1, \dots, e, \dots, E\}$. The total number of experts designated as E ie, e = 1, .., E is the index for the decision maker. It is assumed that, the relative importance of each group of variables is obtained by direct way. Policy makers expressed their estimates using linguistic expressions which are modeled by triangular fuzzy numbers (TFBs).

Step 4. Variable values of happiness are determined on an individual level. Each individual expresses their assessment by one of the six predefined linguistic expressions which are modeled TFB (analog [11,12]).

Step 5. Variables happiness can be benefit type and cost type. By using linear normalization procedure [13], this variable is mopped in to TFN.s which belong to domain

interval 0-1. A value of 0, and a value of 1 indicates that the variable has the least fortunate, and the maximum value, respectively. In this way, the value of variable happiness become comparable.

Step 6. Difficult normalized value variable counts as its normalized value and weight. According to the rules of arithmetic stage [14], this value is also described TFN.

Step 7. He overall happiness index at the individual can be calculated by using fuzzy averaging method. According to fuzzy algebra rules, the value of obtained variable is modeled by TFN.

Step 8. By using defuzzification procedure, the overall happiness index is described by precise number. In this case, moment method [7].

Step 9. In this case, the fuzzy IF-THEN rules must describe the relation among three linguistic variables considered simultaneously with their number of aggregated fuzzy numbers. Because of that, this approach requires fewer and simpler rules. The system can be simplified by discarding the least significant rules. In general, there are a number of ways for determining the IF-THEN rules, for instance: a fuzzy-based reasoning approach evidential ([15,16]). Here, there are five production rules modeled by the triangular fuzzy number $\tilde{s}_q$, $q = 1,..,Q$.

3. A NEW FUZZY ABC MODEL

Uncertainty and imprecision can be good enough to describe the application of fuzzy sets theory ([7,14]. Each fuzzy set is determined by membership function, granulation and domain. The shape of membership function is determined based on the knowledge and experience of decision makers. Subjectivity in determining the shape of membership function can be considered as one of the shortcomings of fuzzy sets theory. In general, the membership function can be a triangle, a trapezoid, an exponential shape, or has the form of Gaussian curve, etc. In almost all the works can be found in the literature, are used triangular and / or trapezoidal membership functions. The triangular membership function in a sufficiently good way to present uncertainty and imprecision considered variables on the other hand does not require complicated mathematical operations. Number of linguistic expressions that describe some of the uncertainty depends on the assessment of experts. It is suggested the human mind can simultaneously most to consider seven linguistic variables. Domains of TFNs which describe the various uncertainties in the general case can be different. There are no rules, recommendations to choose domains. Normally, the domains are defined on the real line into pre-defined interval.

In this paper to describe the relative importance of variable happiness used linguistic expressions:

very low importance- $\tilde{R}_1 = (x;1,1,2.5)$,

low importance- $\tilde{R}_2 = (x;1,2,3)$,

medium importance- $\tilde{R}_3 = (x;1,3,5)$,

high importance- $\tilde{R}_4 = (x;3,4,5)$, and

very high importance- $\tilde{R}_5 = (x;2.5,5,5)$.

Domains of these TFNs are defined on a scale [1-5] rate. A value of 1, and the value of 5 indicates that happiness variable has the lowest, or the highest relative importance, respectively. The values of the variables of happiness can be described using six pre-defined linguistic terms (by analogy [8]). These TFNs are presented:

strongly disagree: $\tilde{V}_1 = (y; 1,1,2.5)$
moderately disagree: $\tilde{V}_2 = (y; 1.5,3,4.5)$
slightly disagree: $\tilde{V}_3 = (y; 3,4.5,6)$
slightly agree: $\tilde{V}_4 = (y; 5,6.5,8)$
moderately agree: $\tilde{V}_5 = (y, 6, 7.5, 9)$
strongly agree: $\tilde{V}_6 = (y; 7.5,9,9)$

Domain of these TFNs are defined as Saatys scale measures [17]. A value of 1, and a value of 9 indicates the minimum and the maximum value of agreement In this paper, the happiness level for each individual is modeled by one of the four predetermined linguistic terms. These linguistic expressions are modeled by TFNs whose domains belong to the interval (0-1). The value 0 denotes total lack of happiness. The value 1 indicates that a single person very happy. The TFNs for modelling the happiness level are: little bit happy - $(z;0,0.1,0.2)$, happy - $(z;0.1.0.2,0.3)$,very happy - $(z;0.3,1,1)$.

The TFNs derived for the selected

linguistic terms, are based on the assumption: if the value of "overall happiness index", ^{h}p is greater than 0.1, it is then considered that the individual p, p=1,..,P is located in the happiness region. In contrast, if h_p is less than 0.1, the individual p, p=1,…,P could be considered like unhappy.

4. THE PROPOSED ALGORITHM

The developed algorithm is implemented through the steps that are further displayed

Step 1. Determine the stage of evaluating the relative importance of each variable of happiness by each decision maker:

$$\sim^{e} W_p, p = 1,.., P; e = 1,.., E \quad (1)$$

Step 2. Calculate the aggregated relative importance of each happiness variable:

$$\sim W_p = \frac{1}{E} \cdot \sum_{e=1}^{E} \sim^{e} W_p, \quad p = 1,..., P; e = 1,.., E \quad (2)$$

That is:

$$l_p = \frac{1}{E} \cdot \sum_{e=1}^{E} l_p^e, \quad (3)$$

$$m_p = \frac{1}{E} \cdot \sum_{e=1}^{E} m_p^e, \quad u_p = \frac{1}{E} \cdot \sum_{e=1}^{E} u_p^e$$

Step 3. Sort aggregated relative values of variables luck in descending order. Comparison of TFNs which describe the relative importance variable of happiness is performed by using the procedures developed in ([1,17]).

Step 4. Fistly (5-10)% of the value of the relative importance of variable happiness belong to group A. These happiness variable have the highest impact to the happiness of the individual. The next 10% corresponded happiness variable of group B. This variable happiness has medium impact to Happy of the individual. The rest happiness of selected variable belong to group C and they have the least effect on the happiness of the individual. The relative importance of variable happiness which belong to group A, B, and C are 0.45, 0.35 and 0.2 respectively.

Step 5. Transform all the linguistic values of the variables in the happiness that apply individual level, in applying the methods of linear normalization:

For beneficiary type of variables

$$\sim r_{ip} = \left(\frac{L_{ip}}{U^*}, \frac{M_{ip}}{U^*}, \frac{U_{ip}}{U^*} \right)$$

$$i = 1,.., I; p = 1,.., P \quad (5)$$

(b) For spending type of variables

$$\sim r_{ip} = \left(\frac{L^-}{U_{ip}}, \frac{L^-}{M_{ip}}, \frac{L^-}{L_{ip}} \right)$$

$$i = 1,.., I; p = 1,.., P \quad (6)$$

where:

$$U^* = \max_{i=i,..,I; p=1,...,P} U_{ip}$$

$$L^- = \min_{i=i,..,I; p=1,...,P} L_{ip}$$

Step 6 Calculate harsh normalized value of each happiness variable i, i=1,..,I:

$$\tilde{h}_{ip} = \left(w_i \cdot l_{ip}, w_i \cdot m_{ip}, w_i \cdot u_{ip} \right), \quad (7)$$

$$i = 1,..., I; p = 1,..., P$$

Step 7. Calculate the overall happiness index at the individual level:

$$\sim h_p = \frac{1}{I} \cdot \sum_{i=1}^{I} \sim h_{ip}, \; i = 1,.., I;; p = 1,.., P \quad (8)$$

Step 8. Determine to the representative scalar of the TFN $\tilde{h}_p, h_p, \; p = 1,.., P$ by using the moment method [7].

Step 9. The happiness level in the observed process can be defined according to the rule:

IF the value of "overall happiness index" equals h_p, THEN the happiness level is described by linguistic expression where $\max_{q=1,..,Q} \mu_{\sim s_q} \left(z = h_p \right) = \mu_{\sim s_q^*}$.

5. THE ILLUSTRATIVE EXAMPLE

The happiness variables are:

I do not feel particularly pleased with how I feel at the moment (i=1)

I am intensely interested for other people (i=2)

I feel that in my life I can be useful (i=3)
I have warm feelings towards almost everyone (i=4)
I rarely wake up rested (i=5)
I'm not very optimistic about the future (i=6)
I think that most of things are fun (i=7)
I'm always active (i=8)
Life is beautiful (i=9)
I do not think that world Is good palce (i=10)
I always laugh (i=11)
I am satisfied in my life (i=12)
I do not think that I m attractive (i=13)
There is a difference in what I would like / not to do and what I did (i=14)
I am very happy (i=15)
I find the beauty in some things (i=16)
I always act positively on other people (i=17)
I have will and time to do everything what I want (i=18)
I feel I do not have the necessary control over my life (i=19)
I feel that I cannot do anything (i=20)
I feel completely mentally stable (i=21)
I often experience the joy and excitement (i=22)
I do not make easy decisions (i=23)
I do not see a special meaning and purpose of my life (i=24)
I fell that I have lots of energy (i=25)
I have good influence on events (i=26)
I do not hang around that other people (i=27)
I do not feel particularly healthy (i=28)
I do not have a particularly good memories from the past (i=29)

The relative importance of treated happiness variables are calculated by applying the proposed Algorithm (Step 1 to Step 4). The calculated values are presented in the Table 1.

Table 1 The weighted normalized values of happiness variable

Table 1 - The weighted normalized values of happiness variable

	$\tilde{W}_p^e$	$\tilde{W}_p$	*Rank*	*Group*
i=1	$\tilde{R}_4, \tilde{R}_2, \tilde{R}_3, \tilde{R}_3$	*(1.5, 3, 4.5)*	*19*	*C*
i=2	$\tilde{R}_1, \tilde{R}_2, \tilde{R}_2, \tilde{R}_1$	*(1, 1.5, 2.75)*	*29*	*C*
i=3	$\tilde{R}_4, \tilde{R}_2, \tilde{R}_3, \tilde{R}_4$	*(2, 3.25, 4.5)*	*18*	*C*
i=4	$\tilde{R}_4, \tilde{R}_5, \tilde{R}_3, \tilde{R}_3$	*(1.875, 3.75, 5)*	*9-13*	*C*
i=5	$\tilde{R}_4, \tilde{R}_5, \tilde{R}_3, \tilde{R}_4$	*(2.375, 4, 5)*	*4-8*	*B*
i=6	$\tilde{R}_2, \tilde{R}_2, \tilde{R}_4, \tilde{R}_1$	*(1.5, 2.25, 3.375)*	*23-24*	*C*
i=7	$\tilde{R}_4, \tilde{R}_4, \tilde{R}_4, \tilde{R}_5$	*(2.875, 4.25, 5)*	*1-3*	*A*
i=8	$\tilde{R}_4, \tilde{R}_5, \tilde{R}_2, \tilde{R}_4$	*(2.375, 3.75, 4.5)*	*9-13*	*C*
i=9	$\tilde{R}_4, \tilde{R}_2, \tilde{R}_2, \tilde{R}_3$	*(1.5, 2.75, 4)*	*20-21*	*C*
i=10	$\tilde{R}_4, \tilde{R}_5, \tilde{R}_4, \tilde{R}_4$	*(2.875, 4.25, 5)*	*1-3*	*A*
i=11	$\tilde{R}_4, \tilde{R}_5, \tilde{R}_3, \tilde{R}_2$	*(1.875, 3.5, 4.5)*	*14-17*	*C*
i=12	$\tilde{R}_4, \tilde{R}_4, \tilde{R}_3, \tilde{R}_4$	*(2.5, 3.75, 5)*	*9-13*	*C*

i=13	$\tilde{R}_1, \tilde{R}_2, \tilde{R}_2, \tilde{R}_3$	*(1, 2, 3.375)*	*25-26*	*C*
i=14	$\tilde{R}_4, \tilde{R}_4, \tilde{R}_3, \tilde{R}_4$	*(2.5, 3.75, 5)*	*9-13*	*C*
i=15	$\tilde{R}_4, \tilde{R}_5, \tilde{R}_2, \tilde{R}_4$	*(2.375, 3.75, 4.5)*	*9-13*	*C*
i=16	$\tilde{R}_4, \tilde{R}_5, \tilde{R}_1, \tilde{R}_4$	*(2.375, 3.5, 4.375)*	*14-17*	*C*
i=17	$\tilde{R}_5, \tilde{R}_5, \tilde{R}_2, \tilde{R}_4$	*(2.25, 4, 4.5)*	*4-8*	*B*
i=18	$\tilde{R}_4, \tilde{R}_5, \tilde{R}_3, \tilde{R}_4$	*(2.375, 4, 5)*	*4-8*	*B*
i=19	$\tilde{R}_2, \tilde{R}_2, \tilde{R}_2, \tilde{R}_2$	*(1,2,3)*	*25-26*	*C*
i=20	$\tilde{R}_3, \tilde{R}_2, \tilde{R}_2, \tilde{R}_2$	*(1, 2.75, 4.5)*	*20-21*	*C*
i=21	$\tilde{R}_4, \tilde{R}_5, \tilde{R}_3, \tilde{R}_3$	*(1.875, 4, 5)*	*4-8*	*B*
i=22	$\tilde{R}_1, \tilde{R}_2, \tilde{R}_3, \tilde{R}_1$	*(1, 1.75, 3.375)*	*27*	*C*
i=23	$\tilde{R}_2, \tilde{R}_5, \tilde{R}_3, \tilde{R}_4$	*(1.875, 3.5, 4.5)*	*14-17*	*C*
i=24	$\tilde{R}_4, \tilde{R}_5, \tilde{R}_3, \tilde{R}_5$	*(2.25, 4, 5)*	*4-8*	*B*
i=25	$\tilde{R}_3, \tilde{R}_2, \tilde{R}_2, \tilde{R}_3$	*(1, 2.5, 4)*	*22*	*C*
i=26	$\tilde{R}_4, \tilde{R}_5, \tilde{R}_4, \tilde{R}_4$	*(2.875, 4.25, 5)*	*1-3*	*A*
i=27	$\tilde{R}_2, \tilde{R}_2, \tilde{R}_3, \tilde{R}_2$	*(1, 2.25, 3.5)*	*23-24*	*C*
i=28	$\tilde{R}_4, \tilde{R}_4, \tilde{R}_3, \tilde{R}_4$	*(2.5, 3.75, 5)*	*9-13*	*C*
i=29	$\tilde{R}_3, \tilde{R}_5, \tilde{R}_1, \tilde{R}_5$	*(1.75, 3.5, 4.375)*	*14-17*	*C*

By using the proposed Algorithm (Step 5 to Step 6) the weighted normalized values of happiness variable are presented in Table 2.

Table 2 The weighted normalized values of happiness variable

	$\tilde{v}_{ip}$	$\tilde{r}_{ip}$	$\tilde{h}_{ip}$		$\tilde{v}_{ip}$	$\tilde{r}_{ip}$	$\tilde{h}_{ip}$
i=1	$\tilde{V}_2$	(0.4,1,1)	(0.08, 0.2,0.2)	i=16	$\tilde{V}_5$	(0.67, 0.83, 1)	(0.134, 0.166, 0.2)
i=2	$\tilde{V}_5$	(0.67, 0.83, 1)	(0.134, 0.166, 0.2)	i=17	$\tilde{V}_6$	(0.83, 1, 1)	(0.291, 0.35, 0.35)
i=3	$\tilde{V}_6$	(0.83, 1, 1)	(0.166, 0.2, 0.2)	i=18	$\tilde{V}_4$	(0.56, 0.72, 0.89)	(0.196, 0.252, 0.311)
i=4	$\tilde{V}_4$	(0.56, 0.72, 0.89)	(0.112, 0.144, 0.178)	i=19	$\tilde{V}_2$	(0.22, 0.33, 0.66)	(0.044, 0.066, 0.132)
i=5	$\tilde{V}_4$	(0.12, 0.15, 0.2)	(0.042, 0.052, 0.07)	i=20	$\tilde{V}_1$	(0.11, 0.11, 0.28)	(0.022, 0.022, 0.056)
i=6	$\tilde{V}_1$	(0.4, 1, 1)	(0.08, 0.2, 0.2)	i=21	$\tilde{V}_5$	(0.67, 0.83, 1)	(0.234, 0.291, 0.35)

i=7	$\tilde{V}_4$	(0.56, 0.72, 0.89)	(0.252, 0.324, 0.401)	i=22	$\tilde{V}_5$	(0.67, 0.83, 1)	(0.134, 0.166, 0.2)
i=8	$\tilde{V}_5$	(0.67, 0.83, 1)	(0.134, 0.166, 0.2)	i=23	$\tilde{V}_3$	(0.17, 0.22, 0.33)	(0.034, 0.044, 0.066)
i=9	$\tilde{V}_6$	(0.83, 1, 1)	(0.166, 0.2, 0.2)	i=24	$\tilde{V}_1$	(0.4, 1, 1)	(0.14, 0.35, 0.35)
i=10	$\tilde{V}_1$	(0.4, 1, 1)	(0.18, 0.45, 0.45)	i=25	$\tilde{V}_5$	(0.67, 0.83, 1)	(0.134, 0.166, 0.2)
i=11	$\tilde{V}_5$	(0.67, 0.83, 1)	(0.134, 0.166, 0.2)	i=26	$\tilde{V}_6$	(0.83, 1, 1)	(0.373, 0.45, 0.45)
i=12	$\tilde{V}_4$	(0.56, 0.72, 0.89)	(0.112, 0.144, 0.178)	i=27	$\tilde{V}_1$	(0.4, 1, 1)	(0.08, 0.2, 0.2)
i=13	$\tilde{V}_1$	(0.4, 1, 1)	(0.08, 0.2, 0.2)	i=28	$\tilde{V}_2$	(0.22, 0.33. 0.66)	(0.044, 0.066, 0.132)
i=14	$\tilde{V}_3$	(0.17, 0.22, 0.33)	(0.034, 0.044, 0.066)	i=29	$\tilde{V}_2$	(0.22, 0.33. 0.66)	(0.044, 0.066, 0.132)
i=15	$\tilde{V}_4$	(0.56, 0.72, 0.89)	(0.112, 0.144, 0.178)				

By applying the proposed Algorithm (Step 7 to Step 8) the overall happiness index is calculated:

$$\tilde{h}_p = \frac{1}{29} \cdot \sum_{i=1}^{I} \tilde{h}_{ip} = \frac{1}{29} * (1.218, 5.455, 6.450) = (0.042, 0.188, 0.222)$$

The representative scalar of TFN used to describe the overall happiness index is:

$$h_p = \text{defuzz}\left(\tilde{h}_p\right) = 0.1705$$

The happiness level in the observed person can be determined according procedure which is proposed in Step 9 of the proposed Algorithm.

$$\mu_{\tilde{s}_1}(z = 0.1705) = 0.295$$

and

$$\mu_{\tilde{s}_2}(z = 0.1705) = 0.705$$

max (0.295, 0.705) =0.705 which means that level of happiness of observed person could be described as happy.

6. DISCUSSION AND CONCLUSION

The value of happiness at the individual level can be determined respecting many happiness variables in the literature a number of mutually different experimental methods have been developed. The research results are important for decision-making both in the field of sociology and in the political domain.

In this paper level of happiness is terminated by use of new fuzzy. The proposed fuzzy model represents extension of model developed in ([8]). In the proposed model, it is assumed that the happiness variable has a different relative importance. Determining of the relative importance of selected variable is stated as fuzzy group decision making problem. Aggregation of expert opinion into group consensus is achieved by applying fuzzy averaging method. The sorting of happiness variable is performed with respect to calculated values of their relative importance. The classification of happiness variable is given by applying ABC method. The weights of happiness variable for each group are assessed by expert team.

The overall happiness index is calculated as middle value of the weighted normalized values of happiness variable. By using if-then rules and calculated value of the overall happiness index, the happiness level can be determined.

Verification of model is performed on one randomly selected person. Model validation should be performed on a representative sample, which represents one of the directions of further research.

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