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PEOPLE SKILLS MEASUREMENT USING TRIANGULAR FUZZY NUMBER BY KARL PEARSON'S COEFFICIENT OF CORRELATION METHOD

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Abstract: Self-management, which is also referred to as "self-control" or "self-regulation," is the ability to regulate one's emotions, thoughts, and behaviours effectively in different situations. People skills are a more general term, and describe the abilities that allow anyone to inspire others and spread positivity. Leadership skills are a type of people skill. Here in this paper we are trying to find out Coefficient of Correlation by Karl Pearson's method using triangular fuzzy number.

Keywords and Phrases: Skill-management, People skill, Triangular fuzzy number (TFN), Coefficient of Correlation, Karl Pearson's.

2010 Mathematics Subject Classification: 03B52.

1. Introduction

Leadership skills [2] [3] allow the leaders to inspire and motivate their team. These abilities help them decide on a direction and make sure everyone follows it. They don't necessarily need to have leadership skills to find a job, but they will need them if they're seeking a supervisor or leadership role. Most employers are thinking about their companies' long-term needs during the hiring process. It's likely that they're looking for leadership skills in all the candidates they interview, so that they have a good set of candidates to consider for promotion in the future. There are many situations in our daily life where we know from experience, the direct association between certain variables but we can't put a certain measure to

it. For example, leadership skill for a leader. There are many other factors too, like your interest in that movie, your budget etc. Thus to analyze the situation in detail, leader Communication, Problem Solving, Delegating, Giving & Receiving Feedback, Conflict Resolution, Organization, Motivation Thus to analyze the situation in detail, you need to note down your similar past experiences and form a sort of distribution from that data. It is at this point that you require a Correlation Coefficient, which will now provide the leader with a value, based on which he/she can calculate the possibility of about the keys of leadership. Karl Pearson's Coefficient of Correlation is one such type of parameter. Triangular fuzzy number is used for the following procedure.

2. Basic Properties

2.1. Triangular fuzzy number

Definition 2.1. *Triangular fuzzy number A fuzzy number is called triangular fuzzy number if it's membership function is given by*

$$\mu_A(x) = \begin{cases} 0, & x < a_1 \\ \frac{x-a_1}{a_2-a_1}, & a_1 \leq x \leq a_2 \\ \frac{a_3-x}{a_3-a_2}, & a_2 \leq x \leq a_3 \\ 0, & x > a_3. \end{cases}$$

Some arithmetic operations of Triangular Fuzzy Number

• Properties 1

If $\tilde{A}^i = (a_1, b_1, c_1)$ and $\tilde{B}^i = (a_2, b_2, c_2)$ are two TFN then $\tilde{C}^i = \tilde{A}^i \oplus \tilde{B}^i$ is also TFN.

$$\tilde{A}^i \oplus \tilde{B}^i = (a_1 + a_2, b_1 + b_2, c_1 + c_2)$$

• Properties 2

If $\tilde{A}^i = (a_1, b_1, c_1)$ and $\tilde{B}^i = (a_2, b_2, c_2)$ are two TFN then $\tilde{A}^i \ominus \tilde{B}^i$ is also TFN.

$$\tilde{A}^i \ominus \tilde{B}^i = (a_1 - a_2, b_1 - b_2, c_1 - c_2)$$

• Properties 3

If $\tilde{A}^i = (a_1, b_1, c_1)$ and $\tilde{B}^i = (a_2, b_2, c_2)$ are two TFN then $\tilde{A}^i \oslash \tilde{B}^i$ is also TFN.

$$\tilde{A}^i \oslash \tilde{B}^i = (a_1/a_2, b_1/b_2, c_1/c_2)$$

• **Properties 4**

If $\tilde{A}^i = (a_1, b_1, c_1)$ and $\tilde{B}^i = (a_2, b_2, c_2)$ are two TFN then $\tilde{P}^i = \tilde{A}^i \odot \tilde{B}^i$ is an approximated TFN.

$$\tilde{A}^i \odot \tilde{B}^i = (a_1 a_2, b_1 b_2, c_1 c_2)$$

• **Properties 5**

If $\tilde{A}^i = (a_1, b_1, c_1)$ and $y = ka(k > 0)$, then $\tilde{y}^i = k\tilde{A}^i$ is a TFN (ka_1, kb_1, kc_1).
If $y = ka(k < 0)$, then $\tilde{y}^i = k\tilde{A}^i$ is a TFN (kc_1, kb_1, ka_1).

Coefficient of Correlation

The Karl Pearson's product-moment correlation coefficient (or simply, the Pearson's correlation coefficient) is a measure of the strength of a linear association between two variables and is denoted by r or $r(X, Y)$ (X and Y being the two variables involved).

This method of correlation [18] [19] attempts to draw a line of best fit through the data of two variables, and the value of the Pearson correlation coefficient, r, indicates how far away all these data points are to this line of best fit.

Karl Pearson's coefficient of correlation or correlation coefficient (r) between two variables X and Y is defined by:

$$\begin{aligned} r &= \frac{cov(X,Y)}{\sigma_X . \sigma_Y} \\ &= \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{n\sigma_X . \sigma_Y} \\ &= \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\Big\{\sum(x_i - \bar{x})^2\Big\}\Big\{\sum(y_i - \bar{y})^2\Big\}}} \end{aligned}$$

Properties of the Pearson's Correlation Coefficient

$\Longrightarrow$ r is unit-less. Thus, we may use it to compare [28] association between totally different bivariate distributions as well. For e.g. – you may compare how much of you not going for a movie is related to your friends not joining you, and to you not being much interested for the movie yourself, both at the same time, with the Pearson's correlation coefficients obtained from both the cases. In economics therefore, where the cost price or the market shares depend on lots of different factors, this parameter is of utmost importance in ascertaining the connection between various quantities.

$\Longrightarrow$ The value of r always lies between +1 and -1.

People skills

A set of skills enabling a [2] [3] person to get along with others, to communicate ideas effectively, to resolve conflicts, and to achieve personal or business goals. People skills are essential for business functions such as sales, marketing, and customer service, but are also important for all employees in order to ensure the smooth functioning of an organization. Leadership skill is also a people skill. Leadership skills have [4] now been universally recognised as a key ingredient – some would say the key ingredient – in management. A good manager is now by definition a leader. Equally, a good leader will also be a manager. A good leader always has the seven following Enthusiasm, Integrity, Toughness, Fairness, Warmth, Humility, Confidence qualities.

3. Application

Here in this section I take 10 questions randomly which are related to leadership skills and make a survey among 50 leaders from various occupations. After that I have make a list of their linguistic response in a format of triangular fuzzy number. The questions and the linguistic response in TFN format are given below. Using the response try to find out Correlation Coefficient by Karl Pearson's method.

Linguistic response in TFN format:

Q.N	YES	NO
1	$(45, 46, 47)$	$(5, 6, 7)$
2	$(35, 36, 37)$	$(15, 16, 17)$
3	$(37, 38, 39)$	$(13, 14, 15)$
4	$(44, 45, 46)$	$(6, 7, 8)$
5	$(25, 26, 27)$	$(25, 26, 27)$
6	$(20, 21, 22)$	$(30, 31, 32)$
7	$(40, 41, 42)$	$(10, 11, 12)$
8	$(45, 46, 47)$	$(5, 6, 7)$
9	$(26, 27, 28)$	$(24, 25, 26)$
10	$42, 43, 44$	$(8, 9, 10)$

Calculation:

x_i	y_i	$x_i - \bar{x}$	$y_i - \bar{y}$	$(x_i - \bar{x})^2$	$(y_i - \bar{y})^2$	$(x_i - \bar{x})(y_i - \bar{y})$
(45, 46, 47)	(5,6,7)	(9,9,9)	(-9,-9,-9)	(81,81,81)	(81,81,81)	(-81,-81,-81)
(35,36,37)	(15,16,17)	(-1,-1,-1)	(1,1,1)	(1,1,1)	(1,1,1)	(-1,-1,-1)
(37,38,39)	(13,14,15)	(1,1,1)	(-1,-1,-1)	(1,1,1)	(1,1,1)	(-1,-1,-1)
(44,45,46)	(6,7,8)	(8,8,8)	(-8,-8,-8)	(64,64,64)	(64,64,64)	(-64,-64,-64)
(25,26,27)	(25,26,27)	(-11,-11,-11)	(11,11,11)	(121,121,121)	(121,121,121)	(-121,-121,-121)
(20,21,22)	(30,31,32)	(-16,-16,-16)	(16,16,16)	(256,256,256)	(256,256,256)	(-256,-256,-256)
(40,41,42)	(10,11,12)	(4,4,4)	(-4,-4,-4)	(16,16,16)	(16,16,16)	(-16,-16,-16)
(45,46,47)	(5,6,7)	(9,9,9)	(-9,-9,-9)	(81,81,81)	(81,81,81)	(-81,-81,-81)
(26,27,28)	(24,25,26)	(-10,-10,-10)	(10,10,10)	(100,100,100)	(100,100,100)	(-100,-100,-100)
(43,44,45)	(7,8,9)	(7,7,7)	(-7,-7,-7)	(49,49,49)	(49,49,49)	(-49,-49,-49)
$\sum x_i =$	$\sum y_i =$			$\sum(x_i - \bar{x})^2$	$\sum(y_i - \bar{y})^2$	$\sum(x_i - \bar{x})\sum(y_i - \bar{y})$
$(360, 370, 380)$	$(140, 150, 160)$			$= (770, 770, 770)$	$= (770, 770, 770)$	$= (-498, -498, -498)$

$$\bar{x} = \frac{\sum x_i}{n} = \frac{(360, 370, 380)}{10} = (36, 37, 38) \text{ and } \bar{y} = \frac{\sum y_i}{n} = \frac{(140, 150, 160)}{10} = (14, 15, 16)$$

$$r(x, y) = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\left\{\sum(x_i - \bar{x})^2\right\}\left\{\sum(y_i - \bar{y})^2\right\}}}$$

$$= \frac{(-498, -498, -498)}{\sqrt{(770, 770, 770) \times (770, 770, 770)}} = -0.64$$

There is a negative correlation between the two variables i.e. the variables moves in opposite direction i.e. if the value of one of the variables increases the value of the other decrease and vice-versa.

4. Conclusion

In this paper TFN and their arithmetic operations are described. We have also solved a people skills measuring correlation coefficient problem using TFN. The procedure of solving people skills measuring using TFN may help us to solve many other problems. Our approaches and computational procedures may be efficient and simple to implement for calculation in a Triangular fuzzy environment for all fields of skill development where impreciseness occur.

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