

An introduction to Soul Sets

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Abstract— In this paper human quality is considered as a Soul object and the set of Soul objects as a Soul set. The operations on the Soul set and the properties of Soul sets are introduced. It is proved that Soul set satisfies De Morgan's laws. Some applications of Soul set are also introduced with examples.

Key words— Soul object, Soul set, Judgment of Soul object, Soul of Universe, Equation of judgment

1 INTRODUCTION

In this paper human quality is considered as a Soul object Human quality of a person can be judged by other human beings. So the set of Soul objects having varying judgment is considered as a Soul set. The operations on the Soul set, the properties of Soul sets and some applications of Soul set are introduced with examples.

2 DEFINITIONS

2.1 Set

A set is a well-defined collection of objects.

2.2 Soul Object

It is an abstract noun, verb, statement or sentence which represents human quality. Examples: Mercy, Ability to express ideas clearly.

2.3 Soul Set

A Soul set is a set containing Soul objects that have varying judgment. It is denoted as $H = \{ x_1/J_H(x_1), x_2/J_H(x_2), \dots, x_m/J_H(x_m) \}$, where x_i 's are Soul objects and $J_H(x_i)$, the judgment of x_i . The tabular form of Soul set is called Soul Status.

2.4 Judgment of Soul Object

It is a function which assigns to each Soul object x in Soul set H , a unique real number $J_H(x)$ in $[0, 1]$. The real numbers 0 and 1 stand for no judgment and full judgment respectively.

2.5 Soul of Universe

It is the set of all Soul objects having full judgment. It is also called Origin and denoted by O .

2.6 Equation of judgment

Let the cardinality of H be m , for a sample size l number of human beings, number of measure levels n , weights preserving measure order w_i , the equation of judgment is defined as

$$J_H(x_j) = \frac{\sum_{i=1}^n w_i k_{ij}}{lw}, \text{ where } w_i \text{ and } k_{ij} \text{ are}$$

non - ve integers such that

$$\sum_{i=1}^n w_i = s \in N, 0 \leq w_1 < w_2 < w_3 < \dots < w_n \leq s,$$

$$w = \max(w_i), \sum_{i=1}^n k_{ij} = l, \forall x_j \in H, i = 1, 2, 3, \dots, n, \\ j = 1, 2, \dots, m.$$

2.7 Soul Set Operations

Let A, B be two Soul subsets of Origin O , then the algebraic operations are defined as follows.

$$\text{Union: } A \cup B = \{ x / J_{A \cup B}(x) = \text{Max} (J_A(x), J_B(x)) \}$$

$$\text{Intersection: } A \cap B = \{ x / J_{A \cap B}(x) = \text{Min} (J_A(x), J_B(x)) \}$$

$$\text{Complement: } A^c = \{ x / J_{A^c}(x) = 1 - J_A(x) \}$$

$$\text{Subset relation: } A \subseteq B \text{ iff } J_A(x) \leq J_B(x)$$

$$\text{Excluded middle axiom: } A \cup A^c \neq O, A \cap A^c \neq \{ \}$$

De Morgan's Laws

$$(A \cup B)^c = A^c \cap B^c$$

$$(A \cap B)^c = A^c \cup B^c$$

$$(A^c)^c = A$$

2.8 Properties of Soul Sets

Let A, B, C be three Soul subsets of Origin O , then the following properties hold.

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Commutativity

$$A \cup B = B \cup A$$

$$A \cap B = B \cap A$$

Associativity

$$(A \cup B) \cup C = A \cup (B \cup C)$$

$$(A \cap B) \cap C = A \cap (B \cap C)$$

Distributivity

$$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$$

$$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$$

Idempotency

$$A \cup A = A, \quad A \cap A = A$$

Identity

$$A \cup \{\} = A,$$

$$A \cap O = A$$

Transitivity

$$\text{If } A \subseteq B \text{ and } B \subseteq C \text{ then } A \subseteq C$$

Involution

$$(A^c)^c = A$$

3 ERROR IN JUDGMENT

If the sample size is very small comparing with the population size or if the measure order is not preserved, then error will occur in judgment. The error in judgment can be reduced by increasing the size of sample and fixing proper measure order-(i.e, the weights assigned should follow the order such that the higher measure level in view of objective of the user should get higher weight).

4 SOME APPLICATIONS OF SOUL SETS

4.1 Example 1

The priest Fr.Paul has desire to know the status of his soul after 10 years of his service as a priest in several churches.How can it be done using Soul set approach?

Method: Father Paul has to list a set of soul objects that he wants to know.He has to inform the management of his current working place to take the feed back from the people

belongs to that place who are expected to get service from him.For example let he wants to know the status of 10 Soul objects Knowledge, Patience, Amicability, Success, Creativity, Mercy, Tolerance, Sincerity, Communication and Charity.Assign 5 measure levels (say) excellent, very good, good, average and poor to the list of 10 Soul objets.Assign the weights $w_1 = 0, w_2 = 1, w_3 = 2, w_4 = 3$ and $w_5 = 4$, to measure levels poor, average, good,very good and excellent respectively. Take a sample of l humanbeings. Through questionnaires take the feedback as just a “√” mark at the intersection of the row and column corresponding to the soul object and measure level respectively. Denote the number of “√” marks in the intersection of j th soul object and i th measure level as k_{ij} .Using equation of judgment if Fr.Paul gets the following Soul set.

$$P = \{ x_1/0.20, x_2/0.66, x_3/0.66, x_4/0.59, x_5/0.57, x_6/0.86, x_7/0.89, x_8/0.95, x_9/0.80, x_{10}/0.66 \}$$

Then the Soul Status of Fr. Paul is

Sl No.	Soul object x_j	Judgment
1	Knowledge	0.82
2	Patience	0.66
3	Amicability	0.66
4	Success	0.59
5	Creativity	0.57
6	Mercy	0.86
7	Tolerance	0.89
8	Charity	0.95
9	Sincerity	0.80
10	Communication	0.66

4.2 Example 2

A P J Abdul Kalam Technological University Kerala decided to measure and upgrade the performance of faculty members in engineering colleges through consolidated feed back three times in a semester.Using Soul sets how can prepare the consolidated feed back ?

Method: Prepare a list of m expected soul objects from a faculty member. Assign measure levels (say)-Out standing, excellent, very good, good, average, poor, very poor to the list of m soul objects.Assign weights as it preserves measure order.Take a sample of l students from a class where the faculty member is teaching.Through questionnaires take the feedback as in example 1 from students.Use equation of judgment.Then a Soul set will be obtained.The Soul Status gives the consolidated feed back.

4.3 Example 3

In an arts and science college every academic year the management declares Best Teacher award to one faculty from every department.The award is based on pass percentage of students and general behaviour. If two faculty members Mr. Edwin Tomson and Mr. Sourier Sebastian teaching in MSc Mathematics classes scored pass percentage 100, how is it possible to select most eligible one for the award?

Method: Assign the weights to measure levels (say) 10 to outstanding , 8 to excellent ,6 to very good, 4 to good, 2 to average, 1 to poor and 0 to very poor. Prepare a list of qualities which are expected from a faculty member. Take feed back from l=30 (say) students of the two faculty members Mr. Edwin Tomson and Mr. Sourier Sebastian as in example 1. Use equation of judgment.

Let the obtained Soul sets are

$$E = \{ x_1/0.80, x_2/0.67, x_3/0.71, x_4/0.69, x_5/0.65, x_6/0.75, x_7/0.91, x_8/0.55, x_9/0.70, x_{10}/0.66 \}$$

$$S = \{ x_1/0.85, x_2/0.68, x_3/0.65, x_4/0.58, x_5/0.70, x_6/0.70, x_7/0.85, x_8/0.90, x_9/0.80, x_{10}/0.66 \}$$

The following table gives the Soul Status

Sl.No.	The Soul object x_j	Judgment on Mr.Edwin T	Judgment on Mr.S.Sebastian
1	Knowledge in the subject	0.80	0.85
2	Ability to express ideas clearly	0.67	0.68
3	Ability to give examples and analogies	0.71	0.65
4	Ability to arouse interest in the subject	0.69	0.58
5	Ability to attract the attention of students	0.65	0.70
6	General behaviour with students	0.75	0.70
7	Willingness to help and inspire students	0.91	0.85
8	Punctuality in coming to the class, returning valued answer papers, assignments, etc.	0.55	0.90
9	Preparation for the class and sincerity in taking class – professional ethics	0.70	0.80
10	Command of English language	0.66	0.66
Average Soul Status		0.709	0.737

Since average Soul status is higher to Mr. Sourier Sebastian, He can be awarded Best Teacher for the academic year.

4.4 Example 4

Let $E = \{ x_1/0.80, x_2/0.67, x_3/0.71, x_4/0.69, x_5/0.65, x_6/0.75, x_7/0.91, x_8/0.55, x_9/0.70, x_{10}/0.66 \}$ and

$S = \{ x_1/0.85, x_2/0.68, x_3/0.65, x_4/0.58, x_5/0.70, x_6/0.70, x_7/0.85, x_8/0.90, x_9/0.80, x_{10}/0.66 \}$. Find EUS and $E \cap S$.

Answer:

$$EUS = \{ x_1/0.85, x_2/0.68, x_3/0.71, x_4/0.69, x_5/0.70, x_6/0.75, x_7/0.91, x_8/0.90, x_9/0.80, x_{10}/0.66 \}$$

$$E \cap S = \{ x_1/0.80, x_2/0.67, x_3/0.65, x_4/0.58, x_5/0.65, x_6/0.70, x_7/0.85, x_8/0.55, x_9/0.70, x_{10}/0.66 \}$$

5 Soul Sets Satisfy De Morgan's Laws

Proof. Let $x \in (A \cup B)^c$

$$\begin{aligned} \text{Since } J_{(A \cup B)^c}(x) &= 1 - J_{A \cup B}(x) \\ &= 1 - \text{Max}(J_A(x), J_B(x)) \\ &= \text{Min}(1 - J_A(x), 1 - J_B(x)) \\ &= \text{Min}(J_{A^c}(x), J_{B^c}(x)) \\ &= J_{A^c \cap B^c}(x) \\ \text{So, } x &\in A^c \cap B^c \end{aligned}$$

Therefore $(A \cup B)^c \subseteq A^c \cap B^c$

Similarly using reverse arguments we shall prove

$$A^c \cap B^c \subseteq (A \cup B)^c$$

Thus $(A \cup B)^c = A^c \cap B^c$

Let $x \in (A \cap B)^c$

$$\begin{aligned} \text{Since } J_{(A \cap B)^c}(x) &= 1 - J_{A \cap B}(x) \\ &= 1 - \text{Min}(J_A(x), J_B(x)) \\ &= \text{Max}(1 - J_A(x), 1 - J_B(x)) \\ &= \text{Max}(J_{A^c}(x), J_{B^c}(x)) \\ &= J_{A^c \cup B^c}(x) \\ \text{So, } x &\in A^c \cup B^c \end{aligned}$$

Therefore $(A \cap B)^c \subseteq A^c \cup B^c$

Similarly using reverse arguments we shall prove

$$A^c \cup B^c \subseteq (A \cap B)^c$$

Thus we get $(A \cap B)^c = A^c \cup B^c$

Let $x \in (A^c)^c$

$$\begin{aligned} \text{Since } J_{(A^c)^c}(x) &= 1 - J_{A^c}(x) \\ &= 1 - (1 - J_A(x)) \\ &= J_A(x) \\ \text{So, } x &\in A \end{aligned}$$

Therefore $(A^c)^c \subseteq A$

Similarly using reverse arguments we shall prove

$$A \subseteq (A^c)^c$$

Thus we get $(A^c)^c = A$

6 CONCLUSION

In this paper human quality is considered as a Soul object and the set of Soul objects as a Soul set. The operations on the Soul set are introduced. It is proved that the Soul set satisfies De Morgan's laws. Some applications of Soul set are also introduced with examples. Soul relations and more applications of Soul sets are under investigation.

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