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Soft Set Theoretic on Marriage Problem Predicate Task.

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Abstract. This report is about theoretical study of soft sets on Marriage Problem Predicate with its tabular representation defined over universe sets, U with set of parameters from the sentence predicates of the case examples used in the research exploration.

Keywords. sentence, predicate name, tabular representation, value set, functional value, soft set, approximation.

1 Introduction

Molodtsov [11] defined the soft set in the following way. Let U be an initial universe set and E be a set of parameters. Let $P(U)$ denotes the power set of U and A subset E .

DEFINITION 2.1. (See 171.) A pair (F, A) IS called a soft set over U , where F is a mapping given by $F:A \text{ implies } P(U)$.

In other words, a soft set over U is a parametrized family of subsets of the universe U . For e member of A . $F(e)$ may be considered as the set of e -approximate elements of the soft set (F, A) . Clearly, a soft set is not a set. For illustration, Molodtsov considered several examples in [11] one of which is presented below.

EXAMPLE 2.1. Suppose the following.

U is the set of houses under consideration.

E is the set of parameters. Each parameter is a word or a sentence.

$E = \{\text{expensive; beautiful; wooden; cheap; in the green surroundings; modern; in good repair; in bad repair}\}.$

In this case, to define a soft set means to point out expensive houses, beautiful houses, and so on.

The soft set (F, E) describes the “attractiveness of the houses” which Mr. X (say) is going to buy.

We consider below the same example in more detail for our next discussion.

Suppose that there are six houses in the universe U given by

$U = \{h_1, h_2, h_3, h_4, h_5, h_6\}$ and $E = \{e_1, e_2, e_3, e_4, e_5\}$:

where

e_1 stands for the parameter ‘expensive’,

e_2 stands for the parameter ‘beautiful’,

e_3 stands for the parameter ‘wooden’,

e_4 stands for the parameter ‘cheap’,

e_5 stands for the parameter ‘in the green surroundings’.

Suppose that

$F(e_1) = \{h_1, h_4\}$

$F(e_2) = \{h_1, h_3\}$

$F(e_3) = \{h_3, h_4, h_5\}$

$F(e_4) = \{h_1, h_3, h_5\}$

$F(e_5) = \{h_1\}$

The soft set (F, E) is a parametrized family $\{F(e_i), i = 1, 2, 3, \dots, 5\}$ of subsets of the set U and gives us a collection of approximate descriptions of an object.

I will illustrate the use of predicate sentence from the celebrated Marriage Problem case example to create first tabular representation on soft set and then generate the parametrized family.

Marriage Problem is about sentences or phrases and counting problems. It is logical structured and involves discrete operations like subtraction, addition and multiplication. It is about alphanumeric labeling of sentences or phrases and proofing of combinatorial enumerations. The theory of combinatorics of sentences or phrases or words is called Letter Combinatorics (LC) with 8 bulletin requirements. A Marriage Problem (MP) made up of 5 sentences is used in the exploit of letter combinatorics. A generating function is calculated for MP to handle constraints of arrangement /selection and the combinatorial enumerations of MP. The predicate sentences are made from [5]. This work looks at soft set concepts on and tabular representation of predicates.

The Marriage Problem states that;

(1) *Damn it.*

(2) *What's wrong?*

(3) *It is a combination of 46 letters.*

(4) *Akua will not marry you.*

(5) *Pokua will not marry you.*

This research is organised as follows :

- Show the parametrized family of soft set from the initial universe set,

- A Look again on the predicate sentences with soft set on tabular representation.

2 Soft Set on Tabular Representation

The next predicate is to determine if a sentence is a question or not. There is only one question in all the five sentences. It is represented as `mpsentenceask` predicate sentence. This category predicate is important in this work.

This will take on two passing values of sentence number and an indicator of a question or not. Yes(Y will be 1) indicates a pass value whiles No(N will be 0) does not. The following question stances are:

1. `mpsentenceask(1, no).`
2. `mpsentenceask(2, yes).`
3. `mpsentenceask(3, no).`
4. `mpsentenceask(4, no).`
5. `mpsentenceask(5, no).`

General Predicate : `mpsentenceask (sentence _no, response).`

In generating a set for `mpsentenceask`(named as MbA) , It will give:

MbA={0, 1, 0, 0, 0}.

The number of words of a sentence is now represented with `mpwordsize` predicate sentences. . The following details are as follows :

1. `mpwordsize(1, 2).`
2. `mpwordsize(2, 2).`
3. `mpwordsize(3, 6).`
4. `mpwordsize(4, 5).`
5. `mpwordsize(5, 5).`

This category predicate is important in this work. The set theoretic form is represented as :

MbWs={1, 1, 1, 1, 1}.

This predicate took its arguments to be the sentence number and the number of words.

General predicate is represented as:

General Predicate : `mpwordsize (sentence_no, word_number).`

Further details on negation sentences are looked at. This will have the predicate sentence,

mpnegation. This is explicitly sentences with a not word.

The problem solution are as follows :

1. mpnegation(1, no).
2. mpnegation(2, no).
3. mpnegation(3, no).
4. mpnegation(4, yes).
5. mpnegation(5, yes).

General Predicate : mpnegation (sentence _no, response).

The set representation of Mpnegation is

MbNg={0, 0, 0, 1, 1}.

MP example has only two negation statements in total. Statements like "damn it" creates a feeling of regret or disappointment. What's wrong did create sudden worry but does not bring the negation that is not interesting. The predicate sentence is represented as mpregret.

These are as follows :

1. mpregret(1, yes).
2. mpregret(2, no).
3. mpregret(3, no).
4. mpregret(4, no).
5. mpregret(5, no).

General Predicate : mpregret (sentence _no, response).

The set theoretical form is given by:

MbR={1, 0, 0, 0, 0}

mpworry is the predicate sentence for sudden worry. These includes the following :

- mpworry(1, no).
- mpworry(2, yes).
- mpworry(3, no).
- mpworry(4, no).
- mpworry(5, no).

General Predicate : mpworry (sentence _no, response).

The set theoretical form is given by:

MbW={0, 1, 0, 0, 0}.

The problem solver took on statement 3 to bring out an approach. The predicate for this will be mpsolver. The knowledge needed to be programmed are as follows:

```

1. mpsolver(1, no).
2. mpsolver(2, no).
3. mpsolver(3, yes).
4. mpsolver(4, no).
5. mpsolver(5, no).

```

General Predicate : mpsolver (sentence _no, response).

The set theoretical form is given by:

MbS={0, 0, 1, 0, 0}.

The third round tried to bring out a solution in the context of problem solving. The 4 and 5 statements are involved with names of female sex. These are Akua and Pokua. The fact base for this representation is captured with predicate sentences, mpnamsex. These will include the following :

- mpnamsex(1, no).
- mpnamsex(2, no).
- mpnamsex(3, no).
- mpnamsex(4, yes).
- mpnamsex(5, yes).

General Predicate : mpnamsex (sentence _no, response).

The set theoretical form is given by:

MbX={0, 0, 0, 1, 1}.

Suppose that there are five predicates in the universe U given by

$U = \{N1, N2, N3, N4, N5\}$ and $E = \{MbA, MbX, MbS, MbR, MbW, MbNg\}$:

where

MbA stands for the parameter 'mpsentenceask',
 MbX stands for the parameter 'mpnamsex',
 MbS stands for the parameter 'mpsolver',
 MbR stands for the parameter 'mpregret',
 MbW stands for the parameter 'mpworry',
 MbNg stands for the parameter 'mpnegation'.

In mapping the power set of the Universe onto the subset of Parameter :

It is suppose that

$F(MbA) = \{N2\}$

$F(MbNg) = \{N4, N5\}$

$F(MbR) = \{N1\}$

$F(MbW) = \{N2\}$

$$F(MbX) = \{N4, N5\}$$

$$F(MbS) = \{N3\}.$$

Therefore $F(MbA)$ means mpsentenceask whose functional value is set{N2}.

Therefore $F(MbNg)$ means mpnegation whose functional value is set{N4, N5}.

Therefore $F(MbR)$ means mpregret whose functional value is set{N1}.

Therefore $F(MbW)$ means mpworry whose functional value is set{N2}.

Therefore $F(MbX)$ means mpnamsex whose functional value is set{N4, N5}.

Therefore $F(MbS)$ means mpsolver whose functional value is set{N3}.

We can view the soft set (F, E) as a collection of approximations as shown below:
 $\{ \text{mpsentenceask}=\{N1\}, \text{mpnamsex}=\{N4, N5\}, \text{mpsolver}=\{N3\}, \text{mpregret}=\{N1\},$
 $\text{mpworry}=\{N2\}, \text{mpnegation}=\{N4, N5\} \}$ where each approximation has two parts:

- (i) a predicate p; and
- (ii) an approximate value-set v(or simply to be called value-set v)

For example the approximation, "mpsentenceask ={N1}", we have the following :

- the predicate name is mpsentenceask and
- the approximate value set or value set is {N1}.

For example the approximation, "mpnamsex ={N4, N5}", we have the following :

- the predicate name is mpnamsex and
- the approximate value set or value set is {N4, N5}

For example the approximation, "mpsolver ={N3}", we have the following :

- the predicate name is mpsolver and
- the approximate value set or value set is {N3}

For example the approximation, "mpregret ={N1}", we have the following :

- the predicate name is mpregret and
- the approximate value set or value set is {N1}

For example the approximation, "mpworry ={N2}", we have the following :

- the predicate name is mpworry and
- the approximate value set or value set is {N2}

For example the approximation, "mpnegation ={N4, N5}", we have the following :

- the predicate name is mpnegation and
- the approximate value set or value set is {N4, N5}

The following are used in forming soft set on tabular representation :

$$MbA=\{0, 1, 0, 0, 0\}.$$

$$MbX=\{0, 0, 0, 1, 1\}.$$

$$MbS=\{0, 0, 1, 0, 0\}.$$

$MbR = \{1, 0, 0, 0, 0\}$

$MbW = \{0, 1, 0, 0, 0\}$.

$MbNg = \{0, 0, 0, 1, 1\}$.

Tabular Representations On Soft Set

U	MbA	MbNg	MbR	MbW	MbX	MbS
N1	0	0	1	0	0	0
N2	1	0	0	1	0	0
N3	0	0	0	0	0	1
N4	0	1	0	0	1	0
N5	0	1	0	0	1	0

$F(MbA)$: The functional value is in $set(N2) = \{1, 0, 0, 1, 0, 0\}$

$F(MbR)$: The functional value is in $set(N1) = \{0, 0, 1, 0, 0, 0\}$

$F(MbW)$: The functional value is in $set(N2) = \{1, 0, 0, 1, 0, 0\}$

$F(MbNg)$: The functional value is in $set(N4, N5) = \{0, 1, 0, 0, 1, 0\}$

$F(MbX)$: The functional value is in $set(N4, N5) = \{0, 1, 0, 0, 1, 0\}$

$F(MbS)$: The functional value is in $set(N3) = \{0, 0, 0, 0, 0, 1\}$.

4 Conclusion

This work on tabular representation and soft computing concludes with the following remarks:

- Six soft response set are achieved.
- Table representation of the soft set is achieved.
- Look at approximation in terms of predicate name and approximate value set is achieved.
- The universe of marriage Problem Predicate is achieved.

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