Set Theoretic on Marriage Problem Predicate Task

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Report Reference

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Abstract. This report is an investigation reference on letter combinatorics showing the predicate sentences in set theoreticals and some series of case examples in table form.

Keywords. sentence, problem solving, words, tableaux, set.

1 INTRODUCTION

Letter combinatorics 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 set theoretical concepts on representation of predicates.
This research is organised as follows :

(1) Look again on the predicate sentences with set theory form,
(2) Generate a Tableaux representation from the set[6,7, 8] form,
(3) Apply set operation on the set state.

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.

2 Set Theoretic Representation

The MP sentences are represented as predicates with each word captured in the predicate sentence, mpsentence(MpS). The following predicate sentences for the MP example are in [5]. This category predicate is important in this work.
These category predicates will be represented as follows in set forms:

```
1. mpsentence(damn, it).
MpS1={damn, it}.

2. mpsentence(what's, wrong).
MpS2={what's, wrong}.

3. mpsentence(it, is, a, combination, of, 46, letters).
MpS3={it, is, a, combination, of, 46, letters}.

4. mpsentence(akua, will, not, marry, you).
MpS4={akua, will, not, marry, you}.

5. mpsentence(pokua, will, not, marry, you).
MpS5={pokua, will, not, marry, you}.

MpS={MpS1, MpS2, MpS3, MpS4, MpS5}
```

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) indicates a pass value whiles No(N) 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 MpA) , It will give:
MpA={N, Y, N, N, N}.

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 :
MpWs={1.2, 2.2, 3.6, 4.5, 5.5}.

The set values are changed to decimal forms to indicate index of values. This so because sets does not accept the same values on indexing.

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
MpNg={N, N, N, Y, Y}.

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:
MpR={Y,  N,  N,  N,  N}.
```

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:
MpW={N,  Y,  N,  N,  N}.
```

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:
MpS={N,  N,  Y,  N,  N}.
```

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:
MpX={N,  N,  N,  Y,  Y}.
```

It will be smart to know of the exact names involved. mpname predicate will be used to store facts of name information. These includes the following sentences:

```
1. mpname(1, people).
2. mpname(2, object).
3. mpname(3, thing).
4. mpname(4, person).
5. mpname(5, person).

General Predicate : mpname (sentence _no, response).

The set theoretical form is given by:
MpR={P,  O,  T,  E,  E},  where p is people, o is object, t is
thing and e person.
```

This predicate captures a person's fact to the database. The assertions are as follows :

- mpperson(1, noname).
- mpperson(2, noname).
- mpperson(3, noname).
- mpperson(4. Akua).
- mpperson(2, Pokua).

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

The set theoretical form is given by:
MpP={N.1,  N.2,  N.3,  A,  P}.
```

The name information brings out the predicate concepts that includes mpstate that combines the words people, person, object and thing to the sentences.
The following statements are made:

- mpstate(1, 'Damn it on people').
- mpstate(2, 'What's wrong with you').
- mpstate(3, 'The thing is a combination of 46 letters')
- mpstate(4, 'A person will not marry you').
- mpstate(5, 'A person will not marry you').

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

The set results is represented by:

MpT={'1.Damn it on people', '2.What's wrong with you', '3.The
thing is a combination of 46 letters', '4.A person will not marry
you',  '5.A person will not marry you'}
```

The Joy of predicates on 5 Secondary sentences is done in conclusion remarks.
Finally, the s-index predicate sentences are enumerated below :

```
1. sindex(1, 1, 6, 2).
2. sindex(2, 1, 10, 2).
3. sindex(3, 1, 27, 7).
4. sindex (4, 1, 19, 5).
5. sindex(5, 1, 20, 5).

General Predicate : sindex ( sentence _no, min_letter, max_letter,
word_count

Si1={1, 6, 2}
Si2={1, 10, 2}
Si3={1, 27, 7}
Si4={1, 19, 5}
Si5={1, 20, 5}

The following set operations are calculated on Si sets:
(1) Unions: Si1 U Si2 U Si3 U Si4 U Si5= {1, 2, 5, 6, 7, 10, 19,
20}
(2) Si1 intersect Si2= {1, 2}
(3) Si2 intersect Si3=  {1}
(4) Si3 intersect Si4= {1}
(4) Si4 intersect Si5= {1, 5}
(5) Si1 intersect Si2 intersect Si3 intersect Si4  intersect Si5=
{1}.
```

Si={Si1, Si2, Si3, Si4, Si5}

The following are used in forming Tableaux representation :
MpA={N, Y, N, N, N},
MpNg={N, N, N, Y, Y},
MpR={Y, N, N, N, N},
MpW={N, Y, N, N, N},
MpX={N, N, N, Y, Y},
MpS={N, N, Y, N, N},

Crisp Set on Tabular Representation

No	MpA	MpNg	MpR	MpW	MpX	MpS
1	N	N	Y	N	N	N
2	Y	N	N	Y	N	N
3	N	N	N	N	N	Y

4	N	Y	N	N	Y	N
5	N	Y	N	N	Y	N

3 Conclusion

This work on set theory concludes with the following remarks:

- Six Y/N response set are achieved.
- Five non-response set are achieved.
- Table representation of the Y/N set is achieved.
- Set operation on s-index is achieved.
- S-index set has 5 subset in achieving.
- The MpS set has 5 member subsets.
- MpWs set is a decimal number memberset.

Further Reading.

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