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Jaina Logic and Decision Support System

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ABSTRACT

According to Jaina logic, **every attribute by being affirmed and denied according to different aspects may bring about seven fundamental propositions true of real subject**, there are no possibilities other than this. In this paper, it is established the strong significance of using Jaina algebra to compare the deductive findings of Sherlock Holmes with the mathematical conclusion using primitives.

Key Words: Jaina logic, Primitives, Valid arguments

INTRODUCTION

Due to the restrictions of the human mind, it is not possible to consider all aspect of human reality. [1]However, we can consider each aspect at a time. Since, it is a relative approach, each prophecy can be confirmed or rejected using seven different possibilities, ranging from "Is" to "Is not". Using this approach, it can be made the seven statements about an object or reality, its affirmation, negation and indescribability as follows.

(1) Perhaps X is (True-T)
(2) Perhaps X is not (False-F)
(3) Perhaps X is and is not (True and False-T&F)
(4) Perhaps X is indescribable (Indeterminant – I)
(5) Perhaps X is though indescribable (True and Indeterminant- T &I)
(6) Perhaps X is not though indescribable (False and Indeterminant – F &I)
(7) Perhaps X is and is not though indescribable (True, False and Indeterminant-T,F &I)

JAINA LOGIC AS MULTI VALUED LOGIC

The classical two – valued logic can be extended into n-valued logic (n ≥2). [4] Several n – valued logic were, in fact developed in the 1930s. The set T_n of truth values of an n – valued logic is thus defined as $T_n = \left\{0=\frac{0}{n-1},\frac{1}{n-1},\frac{2}{n-1},.....,\frac{n-2}{n-1},\frac{n-1}{n-1}=1\right\}$

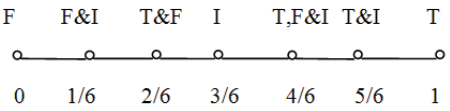
Thus, we assign logical numerical values to the seven fold judgment the Jaina logic and defined

as $T_7 =$

$$\left\{0=\frac{0}{7-1},\frac{1}{7-1},\frac{2}{7-1},\frac{3}{7-1},\frac{4}{7-1},\frac{5}{7-1},\frac{6}{7-1}=1\right\}$$

$$=\left\{0,\frac{1}{6},\frac{2}{6},\frac{3}{6},\frac{4}{6},\frac{5}{6},1\right\}$$

Thus, correlating the symbols and the numerical values of Jaina logic we get,[6]



We observe that when we move from left to right, we gradually move from false to truth.

Basic Definitions

In this section we use primitives of Lukasiewicz logic given by $\bar{a}=1-a$; $a\vee b=\max(a,b)$; $a\Rightarrow b=\min(1,1+b-a)$; $a\Leftrightarrow b=1-|a-b|$ to define $\sim$, $\wedge$, $\vee$, $\rightarrow$ and $\leftrightarrow$. We observe that there are

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totally $7^2 = 49$ possible combinations in the truth value tables given below. In comparison with Boolean logic, where we have only 4 combinations.

The usual forms of valid arguments Modus Ponens, Modus Tollens, Disjunctive addition, Conjunctive simplification, Disjunctive syllogism, Hypothetical syllogism, Dilemma, Conjunctive addition and Rule of contradiction are also satisfied in the context of Jaina logic. In addition to this usual forms, we get a special valid argument form in conjunction with Modus ponens which can be effectively used in detective support system.

The list of all valid arguments is given below:

1. Modus Ponens : $p \rightarrow q,\ p,\ \therefore q$
   In addition, it is observed that
   *** If truth value of p ≤ truth value of q, then truth value of p ⇒ truth value of q is a tautology.** [New Valid Argument]
2. Modus Tollens : $p \rightarrow q,\ \sim q,\ \therefore \sim p$
   Disjunctive addition : a) $p,\ \therefore p \vee q$ b) $q,\ \therefore p \vee q$
   Conjunctive simplification
   $p \vee q,\ \therefore p$ b) $p \wedge q,\ \therefore q$
   Disjunctive syllogism : a) $p \vee q,\ \sim q,\ \therefore p$ b) $p \vee q,\ \sim p,\ \therefore q$
   Hypothetical syllogism :
   $p \rightarrow q,\ q \rightarrow r,\ \therefore p \rightarrow r$
   Dilemma : $p \vee q,\ p \rightarrow r,\ q \rightarrow r,\ \therefore r$
3. Conjuctive addition : $p,\ q,\ \therefore p \wedge q$
4. Rule of contradiction : $\sim p \rightarrow c\ \therefore p$

Authentication using Jaina valid arguments

Sherlock Holmes collected the following points in the "study in scarlet" story [5].

1. It was a robbery.
2. Something would have been taken.
3. It was a revenge.
4. It was for a woman.
5. It was for a politics.
6. The murderer left immediately.
7. The murderer left tracks all over the room.
8. The blood which covered the floor.
9. There was no wound on the victim's body.
10. It should be Victim's blood.
11. It should be Murderer's blood.
12. He detected a sour smell on the victim's lips. He thought that the murderer forced him to drink poison.
13. Stangerson had Drebber's purse in his pocket and a telegram, and containing the words, 'J.H. is in Europe.'
14. Drebber asked for the protection from Jefferson Hope.
15. The police introduced Mr. Jefferson Hope the murderer of Enoch J. Drebber to Mr. Sherlock.
16. Lucy Ferrier and Jefferson Hope loved each other.
17. Drebber forced Lucy Ferrier to marry him (Drebber)
18. After marriage, due to her unwilling marriage she (Lucy) suicided.
19. The person is Jefferson Hope.
20. Jefferson Hope showed Lucy's ring to Drebber and forced him(Drebber) to drink poison.
21. If it was for a woman or for a politics.
    Then, it was a revenge.

Additional points:

(i) "Rache," is the German for 'revenge.'
(ii) The marks of a cab, according to the wheel shape.
(iii) He gathered up some scattered ash from the floor, it is made by a Trichinopoly (name of the cigarettes).
(iv) He (Sherlock) found agitated expression on the victim'
(v) When a man writes on a wall, his instinct leads him to write about the level of his own eyes. Now that writing was just over six feet from the ground.
(vi) He found a woman's wedding ring.

Now let us use the premises 1 to 21 to arrive of a conclusion using valid arguments we can observe that this conforms to the conclusion deducted by Sherlock Holmes.

- $1 \Rightarrow 2$, If it was a robbery, then something would have been taken.
- 2, Nothing was taken. ~ 1, By Modus Tollens, ∴ It was not a robbery.

$3 \Rightarrow 4 \vee 5$, If it was a revenge, then it must have been for a woman or for a politics.

$5 \Rightarrow 6$, If it was for a politics, then the murderer would have left immediately.

$7 \Rightarrow 6$, If the murderer left tracks all over the room. then, he could not have left immediately.

$5 \Rightarrow 6, 6, \therefore \sim 5$, The murderer did not leave immediately. So, it is not for a politics, By Modus Tollens

$4 \vee 5,\ \sim 5,\ \therefore 4$, It was for a woman, By Disjunctive Syllogism

$8 \Rightarrow 10 \vee 11$, If the blood which covered the floor then it should be victim's blood or murderer's blood.

$9 \Rightarrow$ 10, There was no wound on the victim's body. ∴ It was not a victim's blood.

$10 \vee 11, \sim 10, \therefore 11$, It was murderer's blood, By Disjunctive Syllogism

13, In Drebber's purse the words, 'J.H.is in Europe'was there.

14, Drebber asked for the protection from Jefferson Hope.

$13 \vee 14$, In Drebber's purse the words, 'J.H. is in Europe'was there and Drebber asked for the protection from Jefferson Hope, By Conjuctive addition

19, The Person is Jefferson Hope, By additional points (ii), (iii), (v) for confirmation

17⇒18, If Drebber forced Lucy Ferrier to marry him(Drebber).then, After marriage, due to her unwilling marriage she(Lucy) suicided.

16 ∨ 17,16 ⇒ 18, 17 ⇒ 18, ∴18, Lucy suicided, By Dilemma

16⇒20, Lucy Ferrier and Jefferson Hope loved each other. So, Jefferson Hope showed Lucy's ring to Drebber and forced him (Drebber) to drink poison, By additional point (iv) for confirmation.

21, It was a revenge for a woman, By the new valid argument.

Thus Jefferson Hope is the murderer authenticating the deductions of Sherlock Holmes.

CONCLUSION

In this paper we state the main observations made by Sherlock Holmes in the story the study of scarlet. We use valid arguments and rules of Jaina algebra to compare the deductive findings of Sherlock Holmes with the mathematical conclusion using primitives.

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