L-Fuzzy Meet Semi Almost Ideals

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Abstract

Algebraic structures like fuzzy sub rings of L-Fuzzy sets have been well studied in the case where the lattice L is distributive. In this paper axioms the concepts can be generalised to the case where the lattice is not distributive. The aim of this current paper is to define the concept of L-fuzzy meet semi almost ideals and also Intutionistic L-fuzzy meet semi almost ideals . Investigate some theorems and examples.

Keywords: L-fuzzy Sets, L-fuzzy Almost Ideals, L-fuzzy Meet Semi Almost Ideals, Non-Distributive Lattice.

Introduction

Zadeh [1] introduced the concept of fuzzy sets in 1965. Intuitionistic Fuzzy sets was initiated by K.T.Akanassov [2]. In our previous papers [5], [6] and [7] the concept of L-Fuzzy Almost Ideal (LFAI) was introduced and concept of primality in L-Fuzzy Almost Ideals and Intutionistic L-Fuzzy Almost Ideals was studied.In [10] ,[11] Chellappa.B and Anand .B discussed Fuzzy join semi L-ideal and Fuzzy join subsemilattices. A.Kavitha and B.Chellappa studied A study on fuzzy meet semi L-ideal and Fuzzy meet semi L-Filter in 2013. In [15] R. Arimalar and Dr. B. Anandh investigated An Intuitionstic Fuzzy Meet Semi L- Filter.

Preliminaries

Let X be a nonempty subset, $(L, \leq, \vee, \wedge)$ be a complete distributive lattice, which has least and greatest elements, say 0 and 1 respectively. Relevant definitions are recalled in this section.

Definition 2.1 Let X be a nonempty set. A mapping by $\mu: X \rightarrow [0,1]$ is called a fuzzy subset of X.

Definition 2.2 Let X be any non-empty set. A mapping $\mu: X \rightarrow L$ with $\mu(0)=1$ and $\mu(1)=0$ is called a L-fuzzy subset of X.

Definition 2.3 Let A be a fuzzy meet semi Lattice. A fuzzy meet subsemi Lattice $\mu: X \rightarrow [0,1]$ is called fuzzy meet semi L- ideal of A if $\forall x,y \in A$, $\mu(x \wedge y) \geq \max\{\mu(x), \mu(y)\}$

Definition 2.4 Let A be a fuzzy join semi Lattice. A fuzzy join subsemi Lattice $\mu: X \rightarrow [0,1]$ is called fuzzy join semi L- ideal of A if $\forall x,y \in A$, $\mu(x \wedge y) \leq \min\{\mu(x), \mu(y)\}$

Definition 2.5 Let R be a ring with unity. Let L be a lattice $(L, \leq, \vee, \wedge)$ not necessarily distributive with least and greatest element 0 and 1 respectively. $\mu: R \rightarrow L$ with $\mu(0) = 1$ and $\mu(1) = 0$ is said to be L-fuzzy almost ideal if $\forall x,y \in R$

- $\mu(x-y) \nless \mu(x) \wedge \mu(y)$
- $\mu(x y) \nless \mu(x)$ and $\mu(x y) \nless \mu(y)$

Definition 2.6 Let $(L, \leq)$ be any lattice with an involutive order reversing operation $N: L \rightarrow L$. Let X be any non-empty set. An Intuitionistic L-Fuzzy Set (ILFS) A in X is defined as an object of the form $A = \{ < x, \mu(x), \nu(x) > / x \in X \}$, where the functions $\mu: X \rightarrow L$ and $\nu: X \rightarrow L$ define the degree of membership and the degree of non-membership respectively and for every $x \in X$ satisfy $\mu(x) \leq N(\nu(x))$.

Definition 2.7 An Intuitionistic L-fuzzy subset $A = \{ < x, \mu(x), \nu(x) > / x \in X \}$ of a ring R is called an Intuitionistic L-fuzzy subring of R if $\forall x,y \in R$

- $\mu_A(x-y) \geq \mu_A(x) \wedge \mu_A(y)$
- $\mu_A(xy) \geq \mu_A(x) \wedge \mu_A(y)$
- $\nu_A(x-y) \leq \nu_A(x) \vee \nu_A(y)$
- $\nu_A(xy) \leq \nu_A(x) \vee \nu A(y)$

Definition 2.8 Let $A = \{ < x, \mu(x), \nu(x) > / x \in X \}$ be an Intuitionistic L-fuzzy set of R. It is called an Intuitionistic L-fuzzy ideal (ILFI) of R if $\forall x,y \in R$

- $\mu_A(x-y) \geq \mu_A(x) \wedge \mu_A(y)$
- $\mu_A(xy) \geq \mu_A(x) \vee \mu_A(y)$
- $\nu_A(x-y) \leq \nu_A(x) \vee \nu_A(y)$
- $\nu_A(xy) \leq \nu_A(x) \wedge \nu_A(y)$

Definition 2.9 Let R be a ring with unity. Let L be a lattice $(L, \leq, \vee, \wedge)$ not necessarily distributive with least and greatest element 0 and 1 respectively, with an involutive order reversing operation $N: L \rightarrow L$. Any ILFS defined by (μ,ν) where $\mu(0) = 1$ and $\mu(1) = 0$ said to be Intuitionistic L-fuzzy Almost Ideal (ILFAI) if $\forall x,y \in R$

- $\mu(x-y) \nless \mu(x) \wedge \mu(y)$
- $\mu(x y) \nless \mu(x)$ and $\mu(x y) \nless \mu(y)$
- $\nu(x-y) \ngtr \nu(x) \vee \nu(y)$
- $\nu(x y) \ngtr \nu(x)$ and $\nu(x y) \ngtr \nu(y)$

Remark 2.10 Consider $\mu: X \rightarrow L$. If L is totally ordered then for all $x,y \in R$, $\mu(x)$ and $\mu(y)$ are comparable. That is either $\mu(x)$ □ $\mu(y)$ or $\mu(x)=\mu(y)$ or $\mu(x)$ □ $\mu(y)$. But if L is not totally ordered then are four possibilities $\mu(x)$ □ $\mu(y)$ or $\mu(x) = \mu(y)$ or $\mu(x)$ □ $\mu(y)$ or $\mu(x)$ and $\mu(y)$ are not comparable. We use the notation $\mu(x)) \nless \mu(y)$ to mean, " $\mu(x)$ □ $\mu(y)$ or $\mu(x) = \mu(y)$ or $\mu(x)$ and $\mu(y)$ are not comparable".

L-Fuzzy Meet Semi Almost Ideals

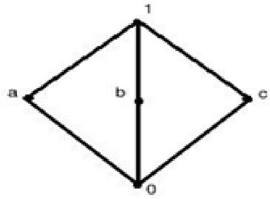
Definition 3.1 Let R be a ring with unity. Let L be a lattice $(L, \leq, \vee, \wedge)$ not necessarily distributive with least and greatest element 0 and 1 respectively. $\mu: R \rightarrow L$ with $\mu(0) = 1$ and $\mu(1) = 0$ is said to be L-fuzzy semi almost ideal if $\mu(x y) \nless \mu(x) \vee \mu(y)$, for all $x,y \in R$.

Definition 3.2 Let R be a ring with unity. Let L be a lattice $(L, \leq, \vee, \wedge)$ not necessarily distributive with least and greatest element 0 and 1 respectively. $\mu: R \rightarrow L$ with $\mu(0) = 1$ and $\mu(1) = 0$ is said to be L-fuzzy meet semi almost ideal if $\mu(x \wedge y) \nless \mu(x) \vee \mu(y)$, $\forall x,y \in R$.

Definition 3.3 Let R be a ring with unity. Let L be a lattice $(L, \leq, \vee, \wedge)$ not necessarily distributive with least and greatest element 0 and 1 respectively. $\mu: R \rightarrow L$ with $\mu(0) = 1$ and $\mu(1) = 0$ is said to be Intuitionistic L-fuzzy meet semi almost ideal if $\forall x,y \in R$

- $\mu(x \wedge y) \nless \mu(x) \vee \mu(y)$
- $\mu(x \wedge y) \ngtr \mu(x) \wedge \mu(y)$

Example 3.4 The following is an example of a L-fuzzy meet semi almost ideal. Let $R = \{0,a,b,c,1\}$. Let L be a lattice $(L, \leq, \vee, \wedge)$ defined by below Hasse diagram. Note that L is not distributive. Define μ: R→ L with μ(x) =1 as μ(x) ={1 if x = 0.4 a if x=0.5 b if x=0.6 c if x=0.7 0 if x=0.8))



Verification that μ is a L-fuzzy meet semi almost ideal can be summarized in the form of a table as follows

L-fuzzy meet semi almost ideal

x	y	0.4	0.5	0.6	0.7	0.8
0.4	μ(x) V μ(y)	1	1	1	c	1
	μ(x Λ y)	1	1	1	1	1
0.5	μ(x) V μ(y)	1	a	1	1	A
	μ(x Λ y)	1	a	a	a	a
0.6	μ(x) V μ(y)	1	1	b	1	B
	μ(x Λ y)	1	a	b	b	B
0.7	μ(x) V μ(y)	c	1	1	c	1
	μ(x Λ y)	a	1	b	a	c
0.8	μ(x) V μ(y)	1	1	1	1	1
	μ(x Λ y)	1	c	1	c	a

Example 3.5 Let L be the lattice given by Hasse diagram in figure-I. Note that it is not distributive. N: L→L is defined by N(0) =1, $N(a_i) = a_{3-i}$, N(b) = b, $N(c_i) = c_{3-i}$, N(1) = 0.
Let A be an ILFS defined by (μ, ν) where
μ(x) = 0, ν(x) = 1 if x ∈ Z - < 3 > - < 5 >
$\mu(x) = a_1$, $\nu(x) = a_1$ if x ∈ < 3 > - < 3^2 > - < 5 >
$\mu(x) = a_2$, $\nu(x) = a_1$ if x ∈ < 3^2 >- < 3^3 > - < 5 >
$\mu(x) = a_3$, $\nu(x) = a_1$ if x ∈ < 3^3 >- < 3^4 > - < 5 >
μ(x) = b = ν(x) if x ∈ < 15 >
$\mu(x) = c_1$, $\nu(x) = c_1$ if x ∈ < 5 >- < 5^2 > - < 3 >
$\mu(x) = c_2$, $\nu(x) = c_1$ if x ∈ < 5^2 >- < 5^3 > - < 3 >
$\mu(x) = c_3$, $\nu(x) = c_1$ if x ∈ < 5^3 >- < 5^4 > - < 3 >
μ(x) =1, ν(x) =0 if x = 0

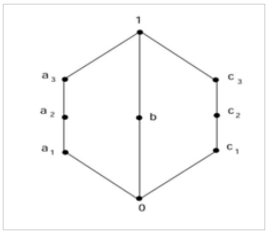


Figure I

By routine calculation we can verify that A is intuitionistic L-fuzzy meet semi almost ideal.

Theorem 3.6 The union of two intuitionistic L-fuzzy meet semi almost ideal is an intuitionistic L-fuzzy meet semi almost ideal.

Theorem 3.7 The intersection of two intuitionistic L-fuzzy meet semi almost ideal is an intuitionistic L-fuzzy meet semi almost ideal.

Theorem 3.8 The complement of two intuitionistic L-fuzzy meet semi almost ideal is an intuitionistic L-fuzzy meet semi almost ideal.

Conclusion

In this paper we have developed the concept of L-fuzzy meet semi almost ideal and also investigate the Intuitionistic L-fuzzy meet semi almost ideal in the case of L is not necessarily distributive. We have proved some theorems and examples.

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