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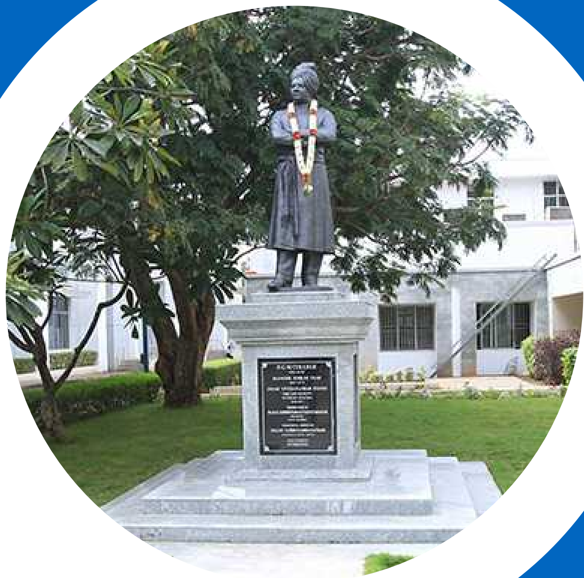

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27th October 2021

Jointly Organized by

Department of Biological Science, Physical Science and Computational Science

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ABOUT THE INSTITUTION

A nations's growth is in proportion to education and intelligence spread among the masses. Having this idealistic vision, two great philanthropists late. S.P. Nallamuthu Gounder and Late. Arutchelver Padmabhushan Dr.N.Mahalingam formed an organization called Pollachi Kalvi Kazhagam, which started NGM College in 1957, to impart holistic education with an objective to cater to the higher educational needs of those who wish to aspire for excellence in knowledge and values. The College has achieved greater academic distinctions with the introduction of autonomous system from the academic year 1987-88. The college has been Re-Accredited by NAAC and it is ISO 9001 : 2015 Certified Institution. The total student strength is around 6000. Having celebrated its Diamond Jubilee in 2017, the college has blossomed into a premier Post-Graduate and Research Institution, offering 26 UG, 12 PG, 13 M.Phil and 10 Ph.D Programmes, apart from Diploma and Certificate Courses. The college has been ranked within Top 100 (72nd Rank) in India by NIRF 2021.

ABOUT CONFERENCE

The International conference on “Emerging Trends in Science and Technology (ETIST-2021)” is being jointly organized by Departments of Biological Science, Physical Science and Computational Science - Nallamuthu Gounder Mahalingam College, Pollachi along with ISTE, CSI, IETE, IEE & RIYASA LABS on 27th OCT 2021. The Conference will provide common platform for faculties, research scholars, industrialists to exchange and discus the innovative ideas and will promote to work in interdisciplinary mode.

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Basic Concepts of Interval-Valued Intuitionistic Fuzzy Topological Vector Spaces

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Abstract - Our aim is to introduce the new concept of interval valued intuitionistic fuzzy topological vector space(in brief IVIF-TVS). In this paper, we introduce the concept of IVIF-vector point, quasi-coincidence. In further, we discuss the relationship between PC-neighbourhood and QC-neighbourhood and its bases in IVIF-topological vector space..

Keywords Pseudo Coincidence, Quasi Coincidence, IVIF-vector points, IVIF-topological vector space, IVIF-convex, neighbour

2010 Subject classification: 54A05, 03E72, 15A03

1 INTRODUCTION

The fuzzy set concept was introduced by Zadeh [16]. The idea of Interval-valued intuitionistic fuzzy set was introduced by Atanassov [1]. Then Atanassov and Gargov [2] generalize intuitinionistic fuzzy set and introduce interval-valued intuitionistic fuzzy set and their properties. Amal Kumar Adak and Manoranjan Bhowmik [4] introduced different types of interval cut-set of IVIFSs, also investigate some properties of those cut-set of IVIFSs.In 2011, Zhang Zhenhua et. al. [17] present a novel approach in generalized interval-valued intuitionistic fuzzy sets by analyzing the degree of hesitancy and introduced, Generalized interval-valued intuitionistic fuzzy sets with parameters. Francisco Gallego Lupianez [7] define and study the notion of quasi-coincidence for intuitionistic fuzzy points and obtain a characterization of continuity for maps between intuitionistic fuzzy topological spaces. Also Coker and Mustafa Demirci [5], introduced quasi-coincidence and pseudo-coincidence of intuitionistic fuzzy points. In further Coker [6] introduced the basic concepts of intuitionistic fuzzy topological spaces. In 2004, Kul Hur et. al. [9] introduced the fundamental concepts of intuitionistic fuzzy Q-neighbourhood, intuitionistic Q-first axiom of countability, intuitionistic first axiom of countability, intuitionistic fuzzy closure operator, intuitionistic fuzzy boundary point and intuitionistic fuzzy accumulation point and investigate some of their properties. In 1977, Katsaras and Liu [8] apply the concept of a fuzzy set to the elementary theory of vector spaces and topological vector spaces. Topologically complete intuitionistic fuzzy metrizable spaces was introduced by Reza Saadati [11]. Topology of interval-valued intuitionistic fuzzy sets concept introduced by Tapas Kumar Mondal and Samanta [14]. In 2014, Mohammed Jassim Mohammed and Ghufran Adeel Ataa [10] introduced and studied the concept of intuitionistic fuzzy topological vector space.

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2 Introduction

Vijaya Balaji and Sivaramakrishnan [15] construct the cartesian product and homomorphism of interval-valued fuzzy linear space. In our previous work [13], we construct interval-valued intuitionistic fuzzy vector spaces and defined some of its properties. In further, we equip the concept of, Topology of Interval-Valued Intuitionistic Fuzzy Sets to interval-valued intuitionistic fuzzy topological vector spaces.

3 Quasi-Coincidence in IVIF-Vector Points

DEfinition 3.1. *Let $\widetilde{X}$ be a nonempty set of IVIF-vectors. An IVIF-vector point denoted by P_x is an IVIF-set P such that there is an $x \in \widetilde{X}$ satisfying:*

$$[\mu_{A_L}(y), \mu_{A_U}(y)] = \begin{cases} [\mu_L, \mu_U] & \text{If } x_\mu = y_\mu \\ 0 & \text{Otherwise} \end{cases}$$

$$[\nu_{A_L}(y), \nu_{A_U}(y)] = \begin{cases} [\nu_L, \nu_U] & \text{If } x_\nu = y_\nu \\ 1 & \text{Otherwise} \end{cases}$$

where $x \in \widetilde{X}$ is a fixed IVIF-vector point. The set of all IVIF-vector points P_x is denoted by $P_t(\widetilde{X})$.
An IVIF-vector point P_x is said to belongs to an IVIF-set A if

$$[\mu_{P_L}(x), \mu_{P_U}(x)] \leq [\mu_{A_L}(x), \mu_{A_U}(x)]$$

and

$$[\nu_{P_L}(x), \nu_{P_U}(x)] \geq [\nu_{A_L}(x), \nu_{A_U}(x)]$$

DEfinition 3.2. *Let $A = \{\langle x, [\mu_{A_L}, \mu_{A_U}], [\nu_{A_L}, \nu_{A_U}]\rangle / x \in \widetilde{X}\}$ and $B = \{\langle x, [\mu_{B_L}, \mu_{B_U}], [\nu_{B_L}, \nu_{B_U}]\rangle / x \in \widetilde{X}\}$ be two IVIF sets in $\widetilde{X}$. If there exists x in $\widetilde{X}$ such that*

$$[\mu_{A_L}(x), \mu_{A_U}(x)] > [\nu_{B_L}(x), \nu_{B_U}(x)]$$

or

$$[\nu_{A_L}(x), \nu_{A_U}(x)] < [\mu_{B_L}(x), \mu_{B_U}(x)]$$

that is, $\mu_{A_L} > \nu_{B_L}$ and $\mu_{A_U} > \nu_{B_U}$ or $\nu_{A_L} < \mu_{B_L}$ and $\nu_{A_U} < \mu_{B_U}$. Then A is said to be quasi-coincident with B and is denoted by AqB.
Otherwise A is not coincident with B. It is denoted by $A\not{q}B$.

Lemma 3.3. *$P(\langle[\mu_L, \mu_U], [\nu_L, \nu_U]\rangle) \in A$ if and only if $P(\langle[\mu_L, \mu_U], [\nu_L, \nu_U]\rangle)\not{q}A^c$*

Proof: The result of this Lemma follows from the Definition 3.1.

Theorem 3.4. *Let A and B be two IVIF-sets in $\widetilde{X}$, then*

1. *$A\not{q}B$ if and only if $A \subseteq B^c$,*
2. *AqB if and only if $A \nsubseteq B^c$.*

Proof: Let $A = \{\langle x, [\mu_{A_L}, \mu_{A_U}], [\nu_{A_L}, \nu_{A_U}]\rangle$ and $B = \{\langle x, [\mu_{B_L}, \mu_{B_U}], [\nu_{B_L}, \nu_{B_U}]\rangle$ be two IVIF-sets in $\widetilde{X}$. Then there exists $x \in \widetilde{X}$ such that by Lemma 3.3 $P(\langle[\mu_L, \mu_U], [\nu_L, \nu_U]\rangle) \in A$ if and only if $P(\langle[\mu_L, \mu_U], [\nu_L, \nu_U]\rangle) \not{q} A^c$ and $P(\langle[\mu_L, \mu_U], [\nu_L, \nu_U]\rangle) \in B$ if and only if
$P(\langle[\mu_L, \mu_U], [\nu_L, \nu_U]\rangle) \not{q} B^c$
To Prove(i): Assume that $A \not{q} B$. This implies that $[\mu_{A_L}, \mu_{A_U}] < [\nu_{B_L}, \nu_{B_U}]$
or $[\nu_{A_L}, \nu_{A_U}] > [\mu_{B_L}, \mu_{B_U}]$. Therefore $A \nsubseteq B$. Hence $A \subseteq B^c$.
In this manner, we can prove the converse part.
To Prove(ii): Assume that AqB. This implies that $[\mu_{A_L}, \mu_{A_U}] > [\nu_{B_L}, \nu_{B_U}]$ or $[\nu_{A_L}, \nu_{A_U}] < [\mu_{B_L}, \mu_{B_U}]$. Therefore $A \subseteq B$. Hence $A \nsubseteq B^c$.

Proposition 3.5. *Let A, B be an IVIF sets and $P(\langle[\mu_L, \mu_U], [\nu_L, \nu_U]\rangle) \in P_t(\widetilde{X})$. For $A \subseteq B$ if and only if $P(\rangle[\mu_L, \mu_U], [\nu_L, \nu_U]\rangle) \in A$ then $P(\langle[\mu_L, \mu_U], [\nu_L, \nu_U]\rangle) \in B$.*

Proof: Suppose that $A \subseteq B$. Assume that $P(\langle[\mu_L, \mu_U], [\nu_L, \nu_U]\rangle) \in A$ for all $y \in \widetilde{X}$,

$$[\mu_L, \mu_U] < [\mu_{A_L}(y), \mu_{A_U}(y)]$$

and

$$[\nu_L, \nu_U] > [\nu_{A_L}(y), \nu_{A_U}(y)]$$

.
Since $A \subseteq B$, we get $[\mu_{A_L}(y), \mu_{A_U}(y)] < [\mu_{B_L}(y), \mu_{B_U}(y)]$ and $[\nu_{A_L}(y), \nu_{A_U}(y)] > [\nu_{B_L}(y), \nu_{B_U}(y)]$. This implies that $[\mu_L, \mu_U] < [\mu_{B_L}(y), \mu_{B_U}(y)]$. Hence $P_x \in B$.
Conversely, suppose that $P_x \in A$ then $P_x \in B$. This implies $[\mu_L, \mu_U] < [\mu_{A_L}(x), \mu_{A_U}(x)]$, $[\nu_L, \nu_U] > [\nu_{A_L}(x), \nu_{A_U}(x)]$. This implies that $[\mu_L, \mu_U] < [\mu_{B_L}(x), \mu_{B_U}(x)]$,$[\nu_L, \nu_U] < [\nu_{B_L}(x), \nu_{B_U}(x)]$. Therefore $[\mu_{A_L}, \mu_{A_U}] < [\mu_{B_L}, \mu_{B_U}]$ and $[\nu_{A_L}, \nu_{A_U}] > [\nu_{B_L}, \nu_{B_U}]$ for all $x \in \widetilde{X}$. Hence $A \subseteq B$.

4 Interval-Valued Intuitionistic Fuzzy Topological Vector Space

DEfinition 4.1. *Let $\widetilde{\tau}$ be an IVIF-topology on the pair $(\widetilde{V}, \widetilde{\tau})$ is called an IVIF-topological vector space if the following two operations of IVIF sets on $\widetilde{V}$ is satisfied:*

1. $+ : \widetilde{V} \times \widetilde{V} \to \widetilde{V}$ *by* $(\alpha, \beta) = \alpha + \beta$,
2. $\bullet : F \times \widetilde{V} \to \widetilde{V}$ *by* $(k, \alpha) = k\alpha$.

Where $\alpha = ([\mu_{\alpha_L}, \mu_{\alpha_U}], [\nu_{\alpha_L}, \nu_{\alpha_U}])$ and $\beta = ([\mu_{\beta_L}, \mu_{\beta_U}], [\nu_{\beta_L}, \nu_{\beta_U}])$. These two operations are IVIF-continuous, F has usual IVIF-topology and $\widetilde{V} \times \widetilde{V}$ and $F \times \widetilde{V}$ are the IVIF-product topologies.

DEfinition 4.2. *If A and B are IVIF-sets in a vector space $\widetilde{V}$ over F and $k \in F$ then we define $A + B$ in $\widetilde{V}$ as*

$$(A + B) = \left\langle \left[\mu_{(A+B)_L}, \mu_{(A+B)_U}\right], \left[\nu_{(A+B)_L}, \nu_{(A+B)_U}\right] \right\rangle$$

That is,

$$\left[\mu_{(A+B)_L}, \mu_{(A+B)_U}\right] = [\mu_{A_L} + \mu_{B_L}, \mu_{A_U} + \mu_{B_U}]$$

and

$$\left[\nu_{(A+B)_L}, \nu_{(A+B)_U}\right] = [\nu_{A_L} + \nu_{B_L}, \nu_{A_U} + \nu_{B_U}]$$

DEfinition 4.3. *If A and B are IVIF-sets in a vector space $\widetilde{V}$ over F and $k \in F$ then we define kA in $\widetilde{V}$ as*

$$kA = \langle k\left[\mu_{A_L}, \mu_{A_U}\right], k\left[\nu_{A_L}, \nu_{A_U}\right]\rangle$$

That is,

$$k\left[\mu_{A_L}(\alpha), \mu_{A_U}(\alpha)\right] = \begin{cases} [\mu_{k_L}(\alpha) \wedge \mu_{A_L}(\alpha), \mu_{k_U}(\alpha) \wedge \mu_{A_U}(\alpha)] & \text{if } k \neq 0 \text{ for all } \alpha \in \widetilde{V} \\ 0 & \text{if } k = 0, \alpha \neq 0 \end{cases}$$

and

$$k\left[\nu_{A_L}(\alpha), \nu_{A_U}(\alpha)\right] = \begin{cases} [(1-\nu_{k_L}(\alpha)) \vee \nu_{A_L}(\alpha), (1-\nu_{k_U}(\alpha)) \vee \nu_{A_U}(\alpha)] & \text{if } k \neq 0 \text{ for all } \alpha \in \widetilde{V} \\ 0 & \text{if } k = 0, \alpha \neq 0. \end{cases}$$

DEfinition 4.4. *An IVIF-set A in $\widetilde{V}$ is said to be IVIF-convex set if $kA+(1-k)A \subset A$ for all $k \in D\,[0,1]$.*

DEfinition 4.5. *An IVIF-subset A on $\widetilde{V}$ is said to be IVIF-neighbourhood points of x if there is $O \in \widetilde{\tau}$ such that $[\mu_L(O(t)), \mu_U(O(t))] \leq [\mu_L(A(t)), \mu_U(A(t))]$ and $[\nu_L(O(t)), \nu_U(O(t))] \geq [\nu_L(A(t)), \nu_U(A(t))], \forall t \in \widetilde{V}$.*

DEfinition 4.6. *A subcollection $\mathscr{B}$ of an neighbourhood points of x is said to be an IVIF-base if $[\mu_L, \mu_U] \in [\phi, [\mu_{A_L}(x), \mu_{A_U}(x)])$ and $[\nu_L, \nu_U] \in ([\nu_{A_L}(x), \nu_{A_U}(x)], I]$*
For $A \in IVIF(\widetilde{V})$ there exists $B \in \mathscr{B}_{\widetilde{\mathscr{V}}}$, such that $[\mu_{B_L}(t), \mu_{B_U}(t)] \leq [\mu_{A_L}(t), \mu_{A_U}(t)]$ and $[\nu_{B_L}(t), \nu_{B_U}(t)] \geq [\nu_{A_L}(t), \nu_{A_U}(t)]$.
For $t \in \widetilde{V}$, $[\mu_{B_L}(x), \mu_{B_U}(x)] > [\mu_L, \mu_U]$ and $[\nu_{B_L}(x), \nu_{B_U}(x)] > [\nu_L, \nu_U]$.

DEfinition 4.7. *Let A be an IVIF-set. If there exists $O \in \widetilde{\tau}$ such that $P_x \notin O^c$ and $A \subseteq O^c$ then the subset of $\widetilde{V}$ is called an PC-neighbourhood of P_x.*

DEfinition 4.8. *Let A be an IVIF-set of $\widetilde{V}$ is said to be an QC-neighbourhood of P_x if there exist $O \in \widetilde{\tau}$ such that $P_x qO \subseteq A$.*
The family of all IVIF-QC-neighbourhood of P_x is denoted by $QC_N(P_x)$.

DEfinition 4.9. *For each $A \in QC_N(P_x)$, there exists $B \in P_t(x)$ such that $[\mu_{B_L}(x), \mu_{B_U}(x)] \leq [\mu_{A_L}(x), \mu_{A_U}(x)]$ and $[\nu_{B_L}(x), \nu_{B_U}(x)] \geq [\nu_{A_L}(x), \nu_{A_U}(x)], x \in \widetilde{V}$, then $QC_N(P_x)$ is said to be an QC_N-base of P_x.*

DEfinition 4.10. *An IVIF-set A on $(\widetilde{V}, \widetilde{\tau})$ is said to be neighbourhood of zero(in brief N_0) if there is an $B \in \widetilde{\tau}$ such that $N_0 qB \subseteq A$.*

Lemma 4.11. *Let A be an IVIF-set and A is an IVIF-convex,$QC(N_0)$, then $int(A)$ is also IVIF-convex, $QC(N_0)$.*

Proof: Assume that an IVIF-set A is QC-neighbourhood of N_0 and IVIF-convex. By definition, there exists $O \in \widetilde{\tau}$ such that $N_0 qO \subseteq A$. Since $O \in \widetilde{\tau}$. This implies, O is an IVIF-open set. That is $O = int(O)$. It implies, $int(O) \subseteq int(A)$. Since $O \subseteq A$. Combining the above equations we get, $N_0 qO \subseteq int(A)$. Therefore $int(A)$ is an $IVIF - QC(N_0)$.
Next we assume that, A is an IVIF-convex. This implies $kA + (1-k)A \subset A$
Consider $k(int(A)) + (1-k)int(A) = int(kA) + int((1-k)A) = int(kA + (1-k)A) \subset int(A)$
Therefore $int(A)$ is also IVIF-convex set.

Theorem 4.12. *Let A be an IVIF-set on $\widetilde{V}$. Then A is an $IVIF - QC_N(P_x)$ if and only if A^c is an $IVIF - PC_N(P_x)$.*

Proof: Suppose that A is an IVIF-$QC_N(P_x)$. Then there is an $O \in \widetilde{\tau}$ such that $P_xqO \subseteq A$. We know that P_xqO implies that $P_x \subseteq O$. And $P_x \notin O^c$. Since $O \subset A$. This implies $A^c \subseteq O^c$. From last two equations, A^c is an $IVIF - PC_N(P_x)$.
Conversely, assume that A^c is an $IVIF - PC_N(P_x)$. Then there is an $O \in \widetilde{\tau}$ such that $P_x \notin O^c$ and $A^c \subseteq O^c$. This implies that $P_x \notin O^c$. From this we get, $P_xqO \subseteq A$. Since $A^c \subseteq O^c$ implies $O \subseteq A$. Thus there is an $O \in \widetilde{\tau}$ such that $P_xqO \subseteq A$. Hence A is an $IVIF - QC_N(P_x)$.

Theorem 4.13. *A is an IVIF-QC neighbourhood of N_0 if and only if A is an $IVIF - N_0$.*

Proof: Assume that A be an $IVIF - N_0$. There is an $O \in \widetilde{\tau}$ such that $N_0qO \subseteq A$. This implies that A is an $IVIF - QC_N(N_0)$.
Conversely assume that, A is an $IVIF - QC_N(N_0)$. By definition, there exists an $O \in \widetilde{\tau}$ such that $N_0qO \subseteq A$. This implies that, at the point of N_0, A is an $IVIF - QC_N(N_0)$. Therefore, A is an $IVIF - N_0$.

Remark 4.14. *From the Theorem 4.11 and 4.12, we can say: Let A be an $IVIF - N_0$ if and only if A^c be an $IVIF - PC_N(N_0)$.*

References

[1] K.T.Atanassov, Fuzzy sets and Systems, *Intuitionistic fuzzy sets*(1986), Vol.20, No. 1, pp.87-96.

[2] K.T.Atanassov & G.Gargov, Fuzzy sets and Systems, *Interval-valued intuitionistic fuzzy sets*(1989), 31, pp.343-349.

[3] Aravind Kumar Sinha & Manoj Kumar Dewangan, International Journal of Research in Advent Technology, *On interval-Valued Intuitionistic (α, β)-Fuzzy H_v-Subgroups*(2015), Vol.3, No. 10, E-ISSN:2321-9637.

[4] Amal Kumar Adak & Manoranjan Bhowmik, African Journal of Mathematics and Computer Science Research, *Interval Cut-Set of Interval-Valued Intuitionistic Fuzzy sets*(2011), Vol.4(4), pp.192-200.

[5] D.Coker, & Mustafa Demirici, Notes on Intuitionistic Fuzzy sets, *On Intuitionistic Fuzzy Points*(1995), Vol.2, pp.79-84.

[6] D.Coker, Fuzzy Sets and Systems, *An Introduction to Intuitionistic Fuzzy Topological Spaces*(1997), pp.81-89.

[7] Francisco Gallego Lupianez, International Journal of Mathematics and Mathematical Sciences, *Quasicoincidence for Intuitionistic Fuzzy Points*(2005), Vol.10 pp.1539-1542.

[8] A.K.Katsaras & D.B.Liu, Journal of Mathematical Analysis and Applications, *Fuzzy Vector Spaces and Fuzzy Topological Vector Spaces*(1977), Vol.58, pp.135-146.

[9] Kul Hur, Jqn Hui Kim & Jang Hyun Ryou, Journal of the Korean Society of Mathematical Education Series B: The Pure and Applied Mathematics, *Intuitionistic Fuzzy Topological Spaces*(2004), Vol.11, No.3, pp.243-265.

[10] Mohammed Jassim Mohammed & Ghufran Adeel Ataa, Journal of College Education for Pure Sciences, *On Intuitionistic Fuzzy Topological Vector Space*(2014), Vol.4,pp.32-51.

[11] Reza Saadati, arxiv:math/0501149v1[math.GN], *On the Intuitionistic Fuzzy Topological(Metric and Normed)Spaces*, 2005.

[12] Sanjib Mondal, Annals of pure and applied mathematics, *Interval-valued fuzzy vector space* (2012), Vol.2, No.1, pp.86 - 95.

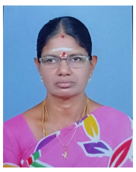
[13] R. Santhi & N.Udhayarani, Notes on Intuitionistic Fuzzy Sets, *Properties of Interval-Valued Intuitionistic Fuzzy Vector Space*(2019),Vol.25, No.1, pp. 12-20.

[14] Tapas Kumar Mondal & Samanta, Fuzzy sets and systems, *Topology of Interval-Valued Intuitionistic Fuzzy Sets* (2001), Vol.119, pp.483-494.

[15] S. Vijaya Balaji & S. Sivaramakrishnan, International Journal of Open problems in Computer Science and Mathematics, *Cartesian Product and homomorphism of Interval-Valued Fuzzy Linear Space*(2012), Vol.5, No.4, ISSN:1998-6262.

[16] L.A. Zadeh, Information and Control, *Fuzzy sets*(1965), 8, pp.338-353.

[17] Zhang Zhenhua, Yang Jingyu,Ye Youpei & Zhang Qiansheng, Procedia Engineering:Advanced in Control Engineering and Information Science, *A Generalized Interval-Valued Intuitionistic Fuzzy sets Theory* (2011), Vol.15, pp.2037-2041.



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