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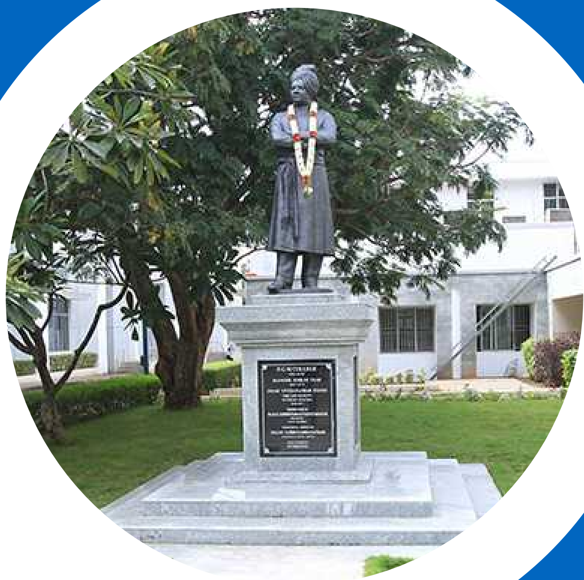

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Jointly Organized by

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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Intuitionistic Fuzzy Soft Strongly Irresolvable Spaces In Intuitionistic Fuzzy Soft Topological Spaces

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ABSTRACT: The main focus of this paper is to introduce the concept of intuitionistic fuzzy soft strongly irresolvable spaces in intuitionistic fuzzy soft topological space. We further studied and established the properties of intuitionistic fuzzy soft strongly irresolvable spaces in intuitionistic fuzzy soft topological space.

Keywords: Intuitionistic fuzzy soft set, intuitionistic fuzzy soft topology, intuitionistic fuzzy soft dense set, intuitionistic fuzzy soft nowhere dense set, intuitionistic fuzzy soft resolvable spaces, intuitionistic fuzzy soft irresolvable spaces, intuitionistic fuzzy soft submaximal spaces, intuitionistic fuzzy soft strongly irresolvable spaces.

1. INTRODUCTION

A number of theories such as the theory of fuzzy sets, theory of intuitionistic fuzzy sets and theory of vague sets have been proposed for dealing with uncertainties in an efficient way and all these have their own difficulties. In 1999 Molodtsov[5] introduced the concept of soft set theory for vagueness. Later in 2001, MAji. P. K., R. Biswas and A. R. Roy[4] introduced the intuitionistic fuzzy soft sets. Moreover, Li and Cui[3] introduced the fundamental concepts of intuitionistic fuzzy soft topology in 2012. Also R. Dhavaseelan, E. Roja and M. K. Uma[1] introduced intuitionistic fuzzy resolvable spaces , intuitionistic fuzzy irresolvable spaces and intuitionistic fuzzy soft open hereditarily irresolvable spaces. Later Shuker Mahmood Khalil, MayadahUlrazaq, Samaher Abdul-Ghani and Abu Firas Al-Musawi introduced fuzzy soft dense set and fuzzy nowhere dense set[6].

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In this paper we define intuitionistic fuzzy soft strongly irresolvable spaces and the properties are discussed.

2. PRELIMINARIES

Definition:2.1[2] Let U be an initial set and E be the set of parameters. Let IF^U denote the collection of all IF subsets of U. Let $A \subseteq E$. A pair (F,A) is called an IF soft set over U where F is a mapping given by $F : A \to IF^U$

Definition:2.2[2] An IF soft set (F,A) over U is said to be absolute IF soft set denoted by $\tilde{I}_e$ if for all $e \in A$, F(e) is the IF absolute set $\tilde{1}$ of U where $\tilde{1} = \{(x, 1, 0) : x \in U\}$.

Definition:2.3[2] An IF soft set (F,A) over U is said to be null IF soft set denoted by $\tilde{\varphi}_e$, if for all $e \in A$, F(e) is the IF null set $\tilde{0}$ of U where $\tilde{0} = \{(x, 0, 1) : x \in U\}$.

Definition:2.4[2] Let (F,A) and (G,B) be two IF soft sets over U. We define the difference of (F,A) and (G,B) as the IF soft set (H,C) written as $(F, A) - (G, B) = (H, C), \textit{where } c = A \cap B \textit{ and } \forall e \in C, x \in U,$

$\mu_{H(e)}(x) = \min(\mu_{F(e)}(x), \upsilon_{G(e)}(x))$, $\upsilon_{H(e)}(x) = \max(\upsilon_{F(e)}(x), \mu_{G(e)}(x))$

That means $(F,A)^C = \tilde{I}_e - (F, A)$, $(\tilde{I}_e)^C = \tilde{\varphi}_e$ and $(\tilde{\varphi}_e)^C = \tilde{I}_e$

Definition:2.5[2] *Let* $\tilde{\tau}_e \subseteq IFS(U_E)$, then $\tilde{\tau}_e$ is said to be an IF soft topology on U if the following conditions hold

(i). $\tilde{\varphi}_e$ and $\tilde{I}_e$ belong to $\tilde{\tau}_e$

(ii). The union of any number of IF soft sets in $\tilde{\tau}_e$ belongs to $\tilde{\tau}_e$.

(iii). The intersection of any two IF soft sets in $\tilde{\tau}_e$ belongs to $\tilde{\tau}_e$.

$\tilde{\tau}_e$ is called an IF soft topology over U and the triplet $(U, \tilde{\tau}_e, E)$ is called an IF soft topological space over U.

The members of $\tilde{\tau}_e$ are said to be IF soft open sets in U.

3. INTUITIONISTIC FUZZY SOFT STRONGLY IRRESOLVABLE SPACES.

Definition 3.1: An IFS set (F, E) in an IFS topological space $(U, \tilde{\tau}_e, E)$ is called IFS dense if there exist no IFS closed set (G, E) in $(U, \tilde{\tau}_e, E)$ such that $(F, E) \subseteq (G, E) \subseteq \tilde{I}_e$.

Definition 3.2: An IFS set (F, E) in an IFS topological space $(U, \tilde{\tau}_e, E)$ is called IFS nowhere dense if there exists no nonzero IFS open set (G, E) in $(U, \tilde{\tau}_e, E)$ such that $(G, E) \subseteq IFScl(F, E)$. That is $IF\,\mathrm{Sin}\,t(IFScl(F, E)) = \tilde{\phi}_e$

.**Remark:3.3:** Let $(U, \tilde{\tau}_e, E)$ be an IF soft topological space over U and let (F,E) be an IF soft set over U. Then i) $IFScl((F, E)^C) = \tilde{I}_e - IF\,\mathrm{Sint}(F, E)$

i) $IF\,\mathrm{Sint}((F,E)^{C}) = \tilde{I}_e - IFScl(F,E)$

Remark 3.4: (i) If (F, E) is an IF soft nowhere dense set in $(U,\tilde{\tau}_e,E)$, then (F, E)^{C} is an IF soft dense set in $(U,\tilde{\tau}_e,E)$.

(ii) If (F, E) is an IF soft closed set in $(U,\tilde{\tau}_e,E)$ with $IF\,\mathrm{Sin}\,t(F,E) = \tilde{\phi}_e$, then (F, E) is an IF soft nowhere dense set in $(U,\tilde{\tau}_e,E)$.

Definition 3.5: Let $(U,\tilde{\tau}_e,E)$ be an IFS topological space. Then $(U,\tilde{\tau}_e,E)$ is called IFS resolvable if there exists an IFS dense set (F, E) in $(U,\tilde{\tau}_e,E)$ such that $IFScl(\tilde{I}_e - (F,E)) = \tilde{I}_e$. Otherwise $(U,\tilde{\tau}_e,E)$ is called IFS irresolvable.

Definition 3.6: An intuitionistic fuzzy soft topological space $(U,\tilde{\tau}_e,E)$ is called an intuitionistic fuzzy soft submaximal space if each IFS set (F, E) in $(U,\tilde{\tau}_e,E)$ such that $IFScl(F,E) = \tilde{I}_e$, then $(F,E) \in \tilde{\tau}_e$.

Definition 3.7: An intuitionistic fuzzy soft set (F, E) in an intuitionistic fuzzy soft topological space $(U,\tilde{\tau}_e,E)$ is called intuitionistic fuzzy soft first category if $(F,E) = \bigcup_{i=1}^{\infty}(F_i,E_i)$, where ($F_i$, E_i)'s are intuitionistic fuzzy soft nowhere dense sets in $(U,\tilde{\tau}_e,E)$. Otherwise, (F, E) is called an intuitionistic fuzzy soft second category set. Also we say called (F, E)^{C} as an intuitionistic fuzzy soft residual set in $(U,\tilde{\tau}_e,E)$.

Definition 3.8: An IF soft topological space $(U,\tilde{\tau}_e,E)$ is called an IF soft strongly irresolvable space (IF soft strongly irresolvable space, in short) if $IFScl(IF\,\mathrm{Sint}(F,E)) = \tilde{I}_e$ for all IF soft dense set (F, E) in $(U,\tilde{\tau}_e,E)$.

Proposition 3.9: If $(U,\tilde{\tau}_e,E)$ is an intuitionistic fuzzy soft strongly irresolvable space and if $IF\,\mathrm{Sint}(F,E) = \tilde{\phi}_e$ for any non-zero IFsoft set (F, E) in $(U,\tilde{\tau}_e,E)$, then $IF\,\mathrm{Sint}(IFScl(F,E)) = \tilde{\phi}_e$.

Proof: Let (F, E) be a non-zero IFsoft set in $(U,\tilde{\tau}_e,E)$ such that $IF\,\mathrm{Sint}(F,E) = \tilde{\phi}_e$. Then $\tilde{I}_e - IF\,\mathrm{Sint}(F,E) = \tilde{I}_e$ which implies $IF\,\mathrm{S}cl(\tilde{I}_e - (F,E)) = \tilde{I}_e$. Since $(U,\tilde{\tau}_e,E)$ is an intuitionistic fuzzy soft strongly irresolvable space, we have $IF\,\mathrm{S}cl(IF\,\mathrm{Sin}\,t(\tilde{I}_e - (F,E))) = \tilde{I}_e$ which implies that $\tilde{I}_e - IF\,\mathrm{Sin}\,t(IF\,\mathrm{S}cl(F,E)) = \tilde{I}_e$. Therefore $IF\,\mathrm{Sint}(IFScl(F,E)) = \tilde{\phi}_e$.

Proposition 3.10: If $(U,\tilde{\tau}_e,E)$ is an intuitionistic fuzzy soft strongly irresolvable space and if $IF\,\mathrm{Sint}(IFScl(F,E)) \neq \tilde{\phi}_e$ for any non-zero IFsoft set (F, E) in $(U,\tilde{\tau}_e,E)$, then $IF\,\mathrm{Sint}(F,E) \neq \tilde{\phi}_e$.

Proof: Let (F, E) be a non-zero IFsoft set in $(U,\tilde{\tau}_e,E)$ such that $IF\,\mathrm{Sint}(IFScl(F,E)) \neq \tilde{\phi}_e$. We claim that $IF\,\mathrm{Sint}(F,E) \neq \tilde{\phi}_e$. Suppose that $IF\,\mathrm{Sint}(F,E) = \tilde{\phi}_e$. Then $\tilde{I}_e - IF\,\mathrm{Sin}\,t(F,E)) = \tilde{I}_e$ implies $IF\,\mathrm{S}cl(\tilde{I}_e - (F,E)) = \tilde{I}_e$. Since $(U,\tilde{\tau}_e,E)$ is an intuitionistic fuzzy soft strongly irresolvable space, we have $IF\,\mathrm{S}cl(IF\,\mathrm{Sin}\,t(\tilde{I}_e - (F,E))) = \tilde{I}_e$

which implies that $\tilde{I}_e - IF\,\mathrm{S}\sin t(IF\,\mathrm{S}cl(F,E)) = \tilde{I}_e$. Therefore $IF\,\mathrm{Sint}(IFScl(F,E)) = \tilde{\phi}_e$, which is a contradiction. Hencewe must have $IF\,\mathrm{Sint}(F,E) \neq \tilde{\phi}_e$.

Proposition 3.11: If $(U,\tilde{\tau}_e,E)$ is an intuitionistic fuzzy soft strongly irresolvable space, then $(U,\tilde{\tau}_e,E)$ is an intuitionistic fuzzy soft irresolvable space.

Proof: Let (F, E) be a non-zero IFsoft set in $(U,\tilde{\tau}_e,E)$ such that $IF\,\mathrm{S}cl(F,E) = \tilde{I}_e$. We claim that $IF\,\mathrm{Sint}(F,E) \neq \tilde{\phi}_e$. Suppose that $IF\,\mathrm{Sint}(F,E) = \tilde{\phi}_e$. Then $\tilde{I}_e - IF\,\mathrm{S}\sin t(F,E)) = \tilde{I}_e$ implies $IF\,\mathrm{S}cl(\tilde{I}_e - (F,E)) = \tilde{I}_e$. Then $IF\,\mathrm{S}\sin t(IF\,\mathrm{S}cl(\tilde{I}_e - (F,E))) = IF\,\mathrm{S}\sin t(\tilde{I}_e) = \tilde{I}_e$. This implies that $\tilde{I}_e - IF\,\mathrm{S}cl(IF\,\mathrm{S}\sin t(F,E)) = \tilde{I}_e$. Then we have $IF\,\mathrm{S}cl(IF\,\mathrm{S}\sin t(F,E)) = \tilde{\phi}_e$, which is a contradiction to $(U,\tilde{\tau}_e,E)$ is an intuitionistic fuzzy soft strongly irresolvable space. Hence our assumption $IF\,\mathrm{Sint}(F,E) = \tilde{\phi}_e$ is wrong. Hence $IF\,\mathrm{Sint}(F,E) \neq \tilde{\phi}_e$ for all IFsoft dense sets in $(U,\tilde{\tau}_e,E)$. Therefore $(U,\tilde{\tau}_e,E)$ is an intuitionistic fuzzy soft irresolvable space.

Remark 3.12: If (F, E) is an IF soft nowhere dense set in an IF soft topological space $(U,\tilde{\tau}_e,E)$, then $\tilde{I}_e - (F,E)$ is an IF soft dense set in $(U,\tilde{\tau}_e,E)$.

Theorem 3.13: If an intuitionistic fuzzy soft topological space $(U,\tilde{\tau}_e,E)$ is an IF soft sub-maximal space, then $(U,\tilde{\tau}_e,E)$ is an IF soft strongly irresolvable space.

Proof: Let $(U,\tilde{\tau}_e,E)$ be an IF soft sub-maximal space and (F, E) be an IF soft dense set in $(U,\tilde{\tau}_e,E)$. Hence $IFScl(F,E) = \tilde{I}_e$. Since $(U,\tilde{\tau}_e,E)$ be an IF soft sub-maximal space $IFScl(F,E) = \tilde{I}_e$ implies that $(F,E) \in \tilde{\tau}_e$ and hence $IF\,\mathrm{S}\sin t(F,E) = (F,E)$. Therefore $IFScl(IF\,\mathrm{S}\sin t(F,E)) = IFScl(F,E) = \tilde{I}_e$. Therefore $(U,\tilde{\tau}_e,E)$ is an IF soft strongly irresolvable space.

Proposition 3.14: Let $(U,\tilde{\tau}_e,E)$ be an IF soft strongly irresolvable space and If (F, E) is an IF soft dense set in $(U,\tilde{\tau}_e,E)$, then $\tilde{I}_e - (F,E)$ is an IFsoft nowhere dense set in $(U,\tilde{\tau}_e,E)$.

Proof: Let (F, E) be an IF soft dense set in $(U,\tilde{\tau}_e,E)$. Since $(U,\tilde{\tau}_e,E)$ is IF soft strongly irresolvable, $IFScl(IF\,\mathrm{S}\sin t(F,E)) = \tilde{I}_e$. This implies that $\tilde{I}_e - IFScl(IF\,\mathrm{S}\sin t(F,E)) = \tilde{\phi}_e$. Therefore $IF\,\mathrm{S}\sin t(IF\,\mathrm{S}cl(\tilde{I}_e - (F,E))) = \tilde{\phi}_e$ and hence $\tilde{I}_e - (F,E)$ is an IF soft nowhere dense set in $(U,\tilde{\tau}_e,E)$.

Theorem 3.15: If $(U,\tilde{\tau}_e,E)$ is an IF soft strongly irresolvable space and $(F,E) = \bigcap_{i=1}^{\infty}(F_i,E_i)$ is an IF soft dense set in $(U,\tilde{\tau}_e,E)$. Then $\tilde{I}_e - (F,E)$ is an IF soft first category set in $(U,\tilde{\tau}_e,E)$.

Proof: Let $(F,E)=\bigcap_{i=1}^{\infty}(F_i,E_i)$ be an IF soft dense set in $(U,\tilde{\tau}_e,E)$. Then $IFScl(F,E)=IFScl(\bigcap_{i=1}^{\infty}(F_i,E_i))=\tilde{I}_e$. But $IFScl(\bigcap_{i=1}^{\infty}(F_i,E_i))\subseteq\bigcap_{i=1}^{\infty}(IFScl(F_i,E_i))$. Then $\tilde{I}_e\subseteq\bigcap_{i=1}^{\infty}(IFScl(F_i,E_i))$. Thus $\bigcap_{i=1}^{\infty}(IFScl(F_i,E_i))=\tilde{I}_e$. Hence $IFScl(F_i,E_i)=\tilde{I}_e$. Thus $(F_i,E_i)'s$ are IF soft dense set in $(U,\tilde{\tau}_e,E)$. Since $(U,\tilde{\tau}_e,E)$ is an IF soft strongly irresolvable space, by propositon3.14, $(\tilde{I}_e-(F_i,E_i))'s$ are IF soft nowhere dense set in $(U,\tilde{\tau}_e,E)$. Therefore we have $\tilde{I}_e-(F,E)=\bigcup_{i=1}^{\infty}(\tilde{I}_e-(F_i,E_i))$, where $(\tilde{I}_e-(F_i,E_i))'s$ are IF soft nowhere dense set in $(U,\tilde{\tau}_e,E)$. Hence $\tilde{I}_e-(F,E)$ is an IF soft first category set in $(U,\tilde{\tau}_e,E)$.

Theorem 3.16: If $(U,\tilde{\tau}_e,E)$ is an IFsoft strongly irresolvable space and $(F,E)=\bigcap_{i=1}^{\infty}(F_i,E_i)$ be an IF soft dense set in $(U,\tilde{\tau}_e,E)$. Then (F,E) is an IF soft residual set in $(U,\tilde{\tau}_e,E)$.

Proof: Let $(F,E)=\bigcap_{i=1}^{\infty}(F_i,E_i)$ be an IF soft dense set in $(U,\tilde{\tau}_e,E)$. Since $(U,\tilde{\tau}_e,E)$ is an IF soft strongly irresolvable space, by Proposition 3.14, $\tilde{I}_e-(F,E)$ is an IF soft first category set in $(U,\tilde{\tau}_e,E)$. Therefore (F,E) is an IF soft residual set in $(U,\tilde{\tau}_e,E)$.

5. CONCLUSION

The purpose of this paper is to introduce introduce the concept of intuitionistic fuzzy soft strongly irresolvable spaces in intuitionistic fuzzy soft topological spaceand obtain several basic properties

6. ACKNOWLEDGMENT

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