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Available online at http://scik.org
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GENERALIZATION OF ANTI P-FUZZY GROUP WITH ANTI P-FUZZY ALGEBRA FROM THE ALGEBRA A

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Abstract: The Algebras are generalized with Anti Partially ordered fuzzy groups. Our main objective of this work is to define Anti partially ordered algebra and its anti groups on the algebra A. Some Properties of Anti partially ordered algebra are explored. We also discuss about the condition for which Anti partially ordered algebra to be Anti Partially ordered fuzzy groups and similarly condition for Anti Partially ordered fuzzy groups to be Anti partially ordered algebra.

Keywords: anti P-fuzzy algebra (APFA); anti P-fuzzy group (APFG) on the algebra A; P-fuzzy set; P-fuzzy algebra; P- fuzzy subgroup.

AMS Classification Code: 03E72, 28E10, 08A72

1. INTRODUCTION

In 1965, Zadeh mathematically initiated the concept of fuzzy set [4], it opened a new path of thinking to many mathematicians, engineers, physicists, chemists and many others due to its diverse applications in various fields. The Fuzzy Algebraic structures play a important role on Fuzzy Mathematics with wide applications. Rosenfeld [7] in 1971 introduced the concept of fuzzy subgroups, which was the first fuzzification of any algebraic structures. Biswas [6] in 1994

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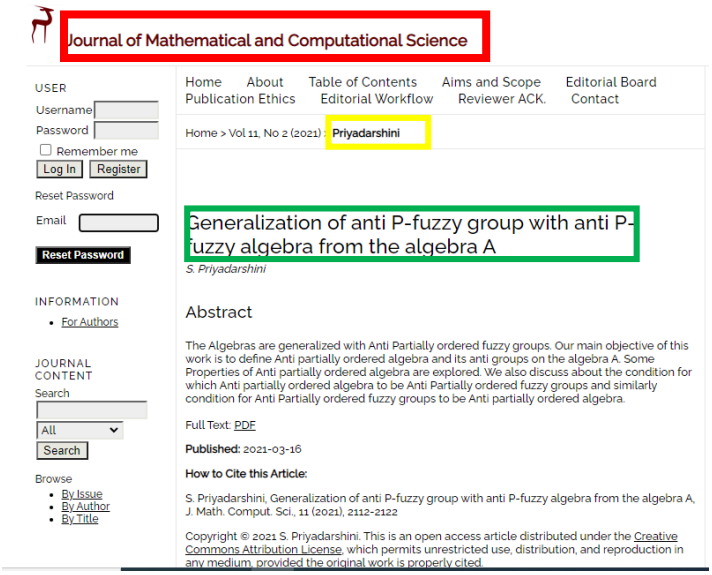

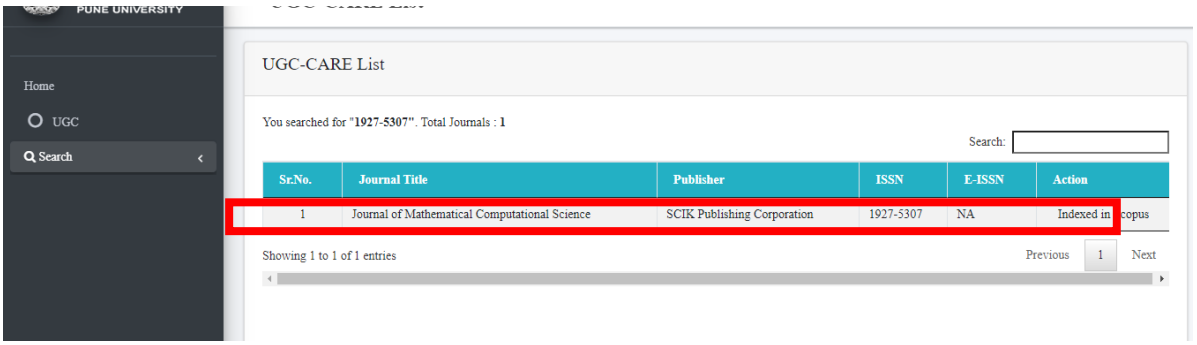


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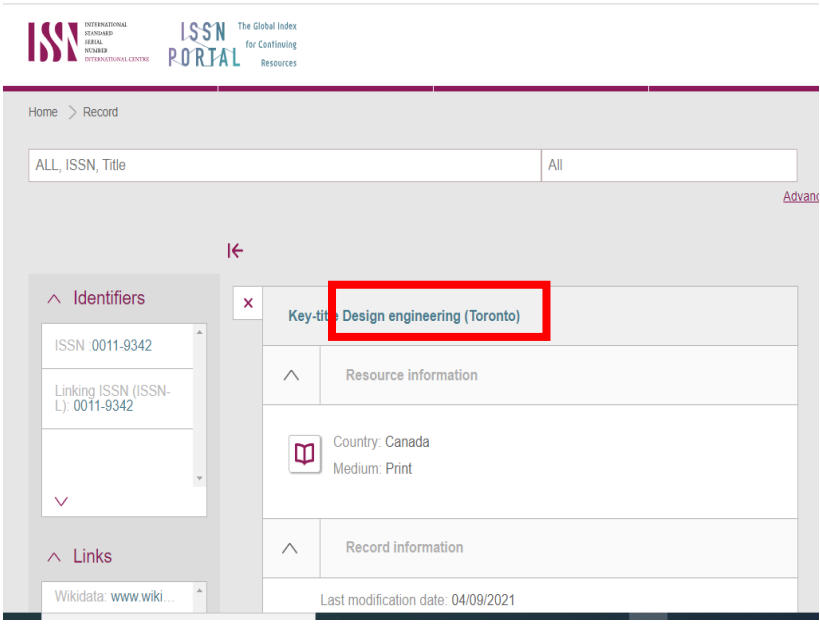
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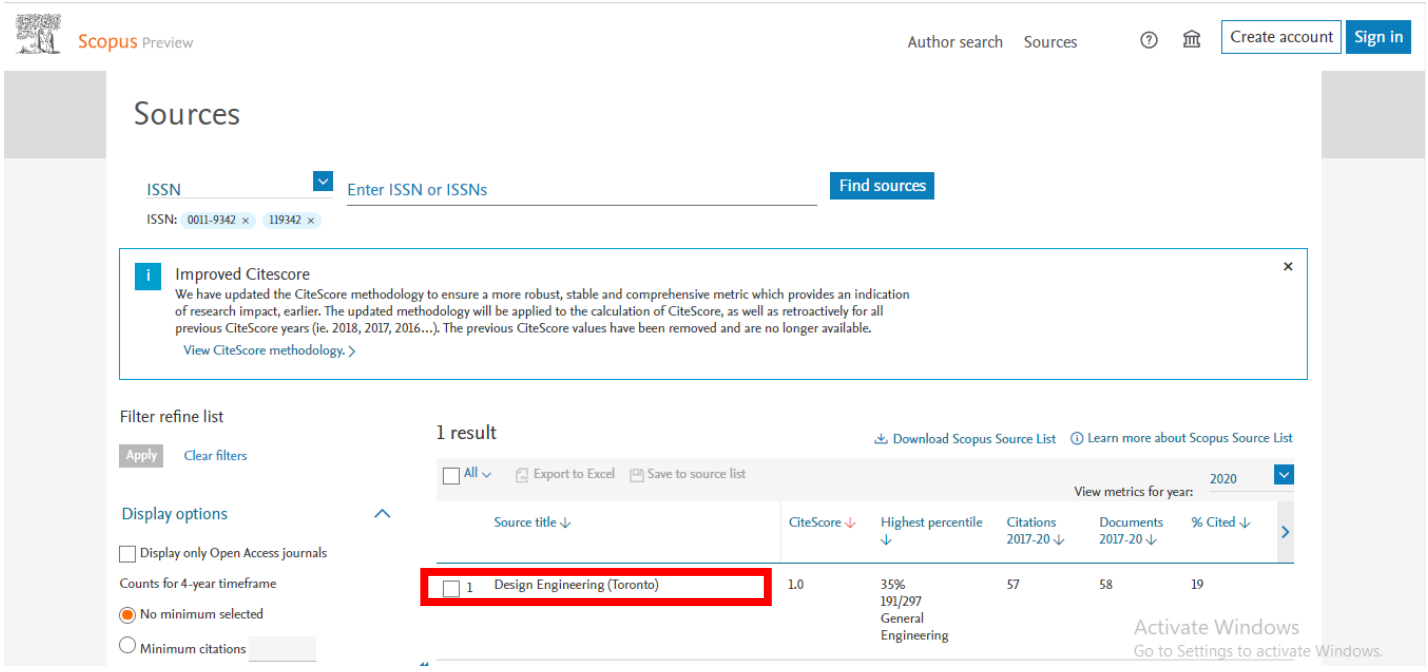
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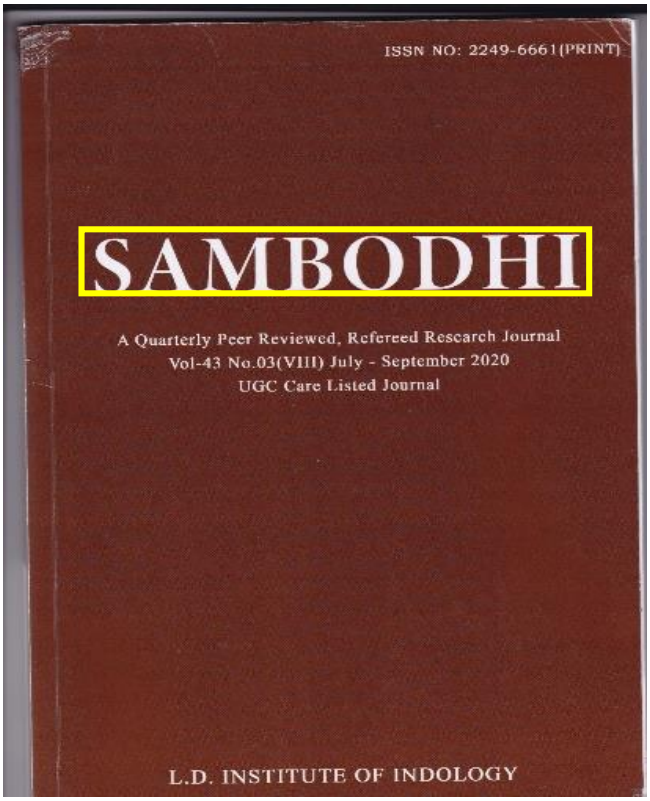

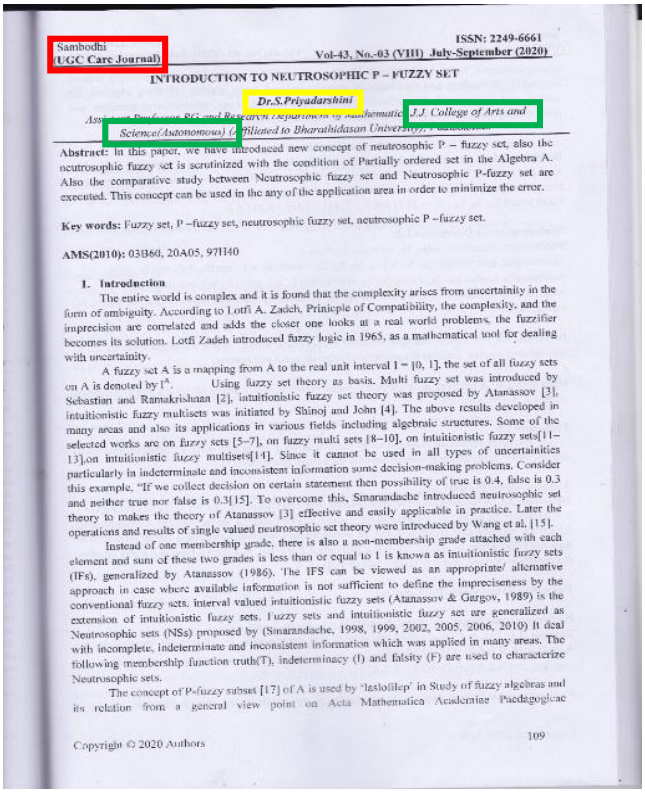

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INTRODUCTION TO NEUTROSOPHIC P – FUZZY SET

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Abstract: In this paper, we have introduced new concept of neutrosophic P – fuzzy set, also the neutrosophic fuzzy set is scrutinized with the condition of Partially ordered set in the Algebra A. Also the comparative study between Neutrosophic fuzzy set and Neutrosophic P-fuzzy set are executed. This concept can be used in the any of the application area in order to minimize the error.

Key words: Fuzzy set, P –fuzzy set, neutrosophic fuzzy set, neutrosophic P –fuzzy set.

AMS(2010): 03B60, 20A05, 97H40

1. Introduction

The entire world is complex and it is found that the complexity arises from uncertainity in the form of ambiguity. According to Lotfi A. Zadeh, Principle of Compatibility, the complexity, and the imprecision are correlated and adds the closer one looks at a real world problems, the fuzzifier becomes its solution. Lotfi Zadeh introduced fuzzy logic in 1965, as a mathematical tool for dealing with uncertainity.

A fuzzy set A is a mapping from A to the real unit interval $I = [0, 1]$, the set of all fuzzy sets on A is denoted by I^A. Using fuzzy set theory as basis, Multi fuzzy set was introduced by Sebastian and Ramakrishnan [2], intuitionistic fuzzy set theory was proposed by Atanassov [3], intuitionistic fuzzy multisets was initiated by Shinoj and John [4]. The above results developed in many areas and also its applications in various fields including algebraic structures. Some of the selected works are on fuzzy sets [5–7], on fuzzy multi sets [8–10], on intuitionistic fuzzy sets[11–13],on intuitionistic fuzzy multisets[14]. Since it cannot be used in all types of uncertainities particularly in indeterminate and inconsistent information some decision-making problems. Consider this example, "If we collect decision on certain statement then possibility of true is 0.4, false is 0.3 and neither true nor false is 0.3[15]. To overcome this, Smarandache introduced neutrosophic set theory to makes the theory of Atanassov [3] effective and easily applicable in practice. Later the operations and results of single valued neutrosophic set theory were introduced by Wang et al. [15].

Instead of one membership grade, there is also a non-membership grade attached with each element and sum of these two grades is less than or equal to 1 is knowa as intuitionistic fuzzy sets (IFs), generalized by Atanassov (1986). The IFS can be viewed as an appropriate/ alternative approach in case where available information is not sufficient to define the impreciseness by the conventional fuzzy sets, interval valued intuitionistic fuzzy sets (Atanassov & Gargov, 1989) is the extension of intuitionistic fuzzy sets. Fuzzy sets and intuitionistic fuzzy set are generalized as Neutrosophic sets (NSs) proposed by (Smarandache, 1998, 1999, 2002, 2005, 2006, 2010) It deal with incomplete, indeterminate and inconsistent information which was applied in many areas. The following membership function truth(T), indeterminacy (I) and falsity (F) are used to characterize Neutrosophic sets.

The concept of P-fuzzy subset [17] of A is used by 'Iasloflep' in Study of fuzzy algebras and its relation from a general view point on Acta Mathematica Academiae Paedagogicae

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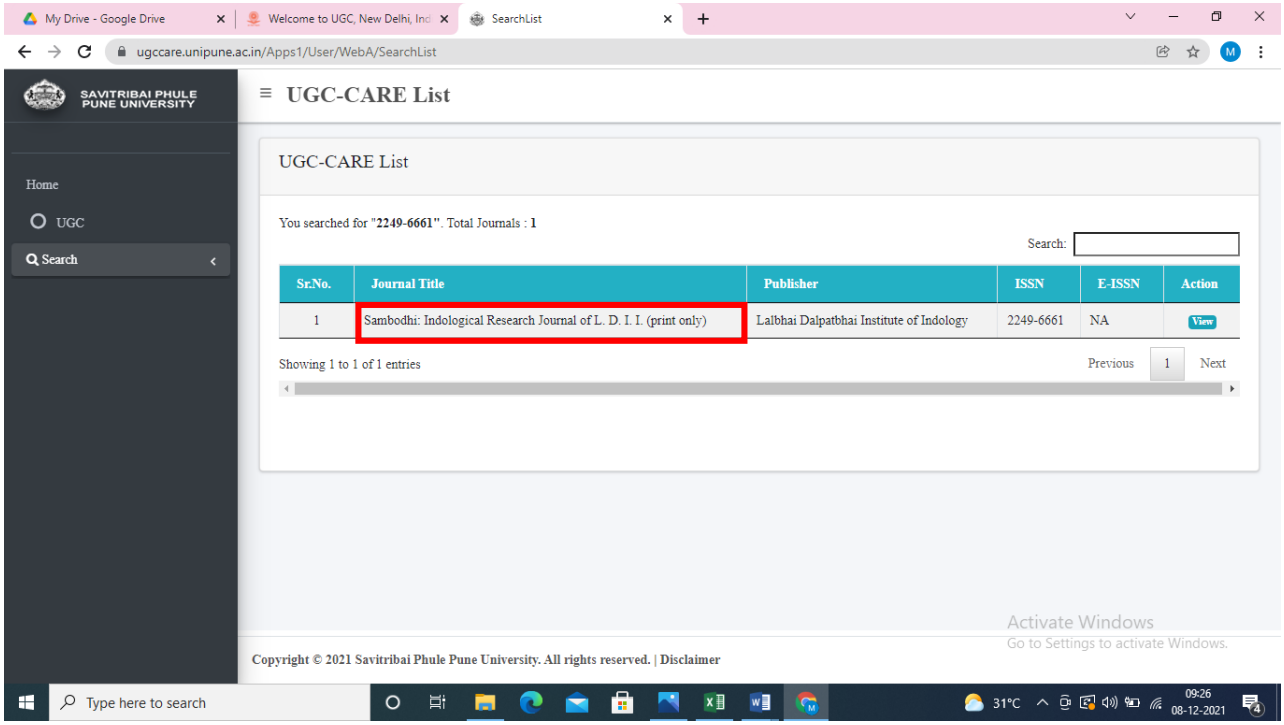

Applications and Applied Mathematics: An International Journal (AAM)

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On Double Fuzzy M-open Mappings and Double Fuzzy M-closed Mappings

J. Sathiyaraj
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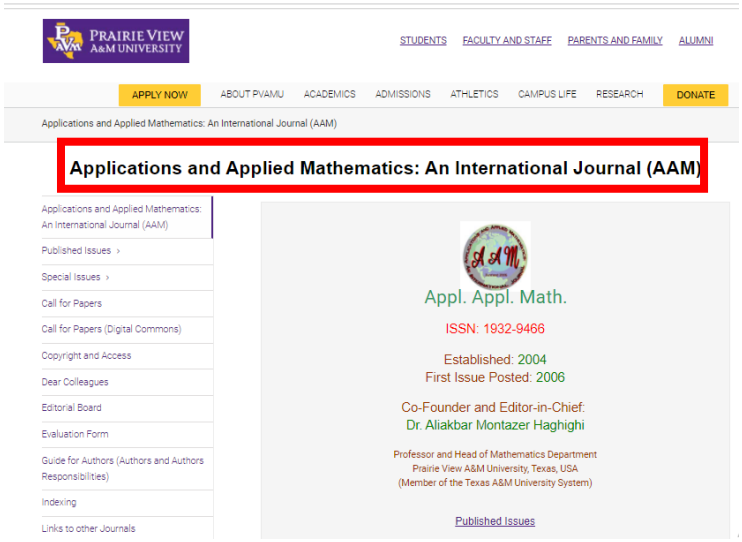

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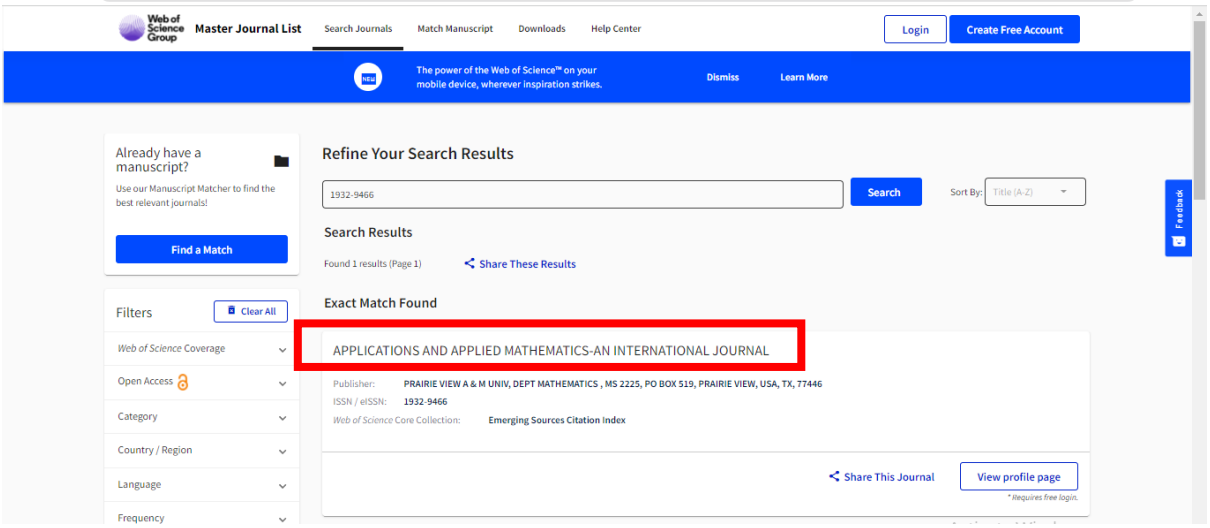

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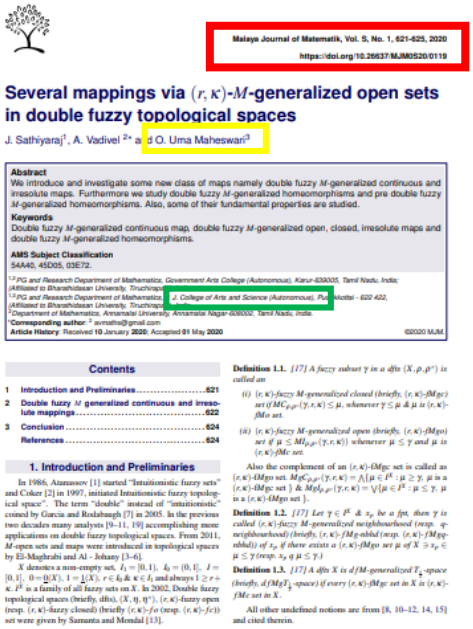

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Several mappings via (r, κ)-M-generalized open sets in double fuzzy topological spaces

J. Sathiyaraj[1], A. Vadivel [2]* and O. Uma Maheswari[3]

Abstract
We introduce and investigate some new class of maps namely double fuzzy M-generalized continuous and irresolute maps. Furthermore we study double fuzzy M-generalized homeomorphisms and pre double fuzzy M-generalized homeomorphisms. Also, some of their fundamental properties are studied.

Keywords
Double fuzzy M-generalized continuous map, double fuzzy M-generalized open, closed, irresolute maps and double fuzzy M-generalized homeomorphisms.

AMS Subject Classification
54A40, 45D05, 03E72.

[1,2]PG and Research Department of Mathematics, Government Arts College (Autonomous), Karur-639005, Tamil Nadu, India; (Affiliated to Bharathidasan University, Tiruchirappalli-620024, Tamil Nadu, India.
[1,3]PG and Research Department of Mathematics, J. J. College of Arts and Science (Autonomous), Pudukkottai - 622 422, (Affiliated to Bharathidasan University, Tiruchirappalli-620024, Tamil Nadu, India.
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Contents

1. Introduction and Preliminaries

In 1986, Atanassov [1] started "Intuitionistic fuzzy sets" and Coker [2] in 1997, initiated Intuitionistic fuzzy topological space". The term "double" instead of "intuitionistic" coined by Garcia and Rodabaugh [7] in 2005. In the previous two decades many analysts [9–11, 19] accomplishing more applications on double fuzzy topological spaces. From 2011, M-open sets and maps were introduced in topological spaces by El-Maghrabi and Al - Johany [3–6].

X denotes a non-empty set, $I_1 = [0, 1]$, $I_0 = (0, 1]$, $I = [0, 1]$, $0 = 0(X)$, $1 = 1(X)$, $r \in I_0$ & $\kappa \in I_1$ and always $1 \geq r + \kappa$. I^X is a family of all fuzzy sets on X. In 2002, Double fuzzy topological spaces (briefly, dfts), (X, η, η^*), (r, κ)-fuzzy open (resp. (r, κ)-fuzzy closed) (briefly (r, κ)-fo (resp. (r, κ)-fc)) set were given by Samanta and Mondal [13].

Definition 1.1. *[17] A fuzzy subset γ in a dfts (X, ρ, ρ^*) is called an*

(i) *(r, κ)-fuzzy M-generalized closed (briefly, (r, κ)-$fMgc$) set if $MC_{\rho,\rho^*}(\gamma, r, \kappa) \leq \mu$, whenever $\gamma \leq \mu$ & μ is (r, κ)-fMo set.*

(ii) *(r, κ)-fuzzy M-generalized open (briefly, (r, κ)-$fMgo$) set if $\mu \leq MI_{\rho,\rho^*}(\gamma, r, \kappa))$ whenever $\mu \leq \gamma$ and μ is (r, κ)-fMc set.*

Also the complement of an (r, κ)-$fMgc$ set is called as (r, κ)-$fMgo$ set. $MgC_{\rho,\rho^*}(\gamma, r, \kappa) = \bigwedge\{\mu \in I^X : \mu \geq \gamma, \mu$ is a (r, κ)-$fMgc$ set $\}$ & $MgI_{\rho,\rho^*}(\gamma, r, \kappa) = \bigvee\{\mu \in I^X : \mu \leq \gamma, \mu$ is a (r, κ)-$fMgo$ set $\}$.

Definition 1.2. *[17] Let $\gamma \in I^X$ & x_p be a fpt, then γ is called (r, κ)-fuzzy M-generalized neighbourhood (resp. q-neighbourhood) (briefly, (r, κ)-fMg-$nbhd$ (resp. (r, κ)-$fMgq$-$nbhd$)) of x_p if there exists a (r, κ)-$fMgo$ set μ of X $\ni x_p \in \mu \leq \gamma$ (resp. $x_p \, q \, \mu \leq \gamma$.)*

Definition 1.3. *[17] A dfts X is $df M$-generalized $T_{\frac{1}{2}}$-space (briefly, $dfMgT_{\frac{1}{2}}$-space) if every (r, κ)-$fMgc$ set in X is (r, κ)-fMc set in X.*

All other undefined notions are from [8, 10–12, 14, 15] and cited therein.

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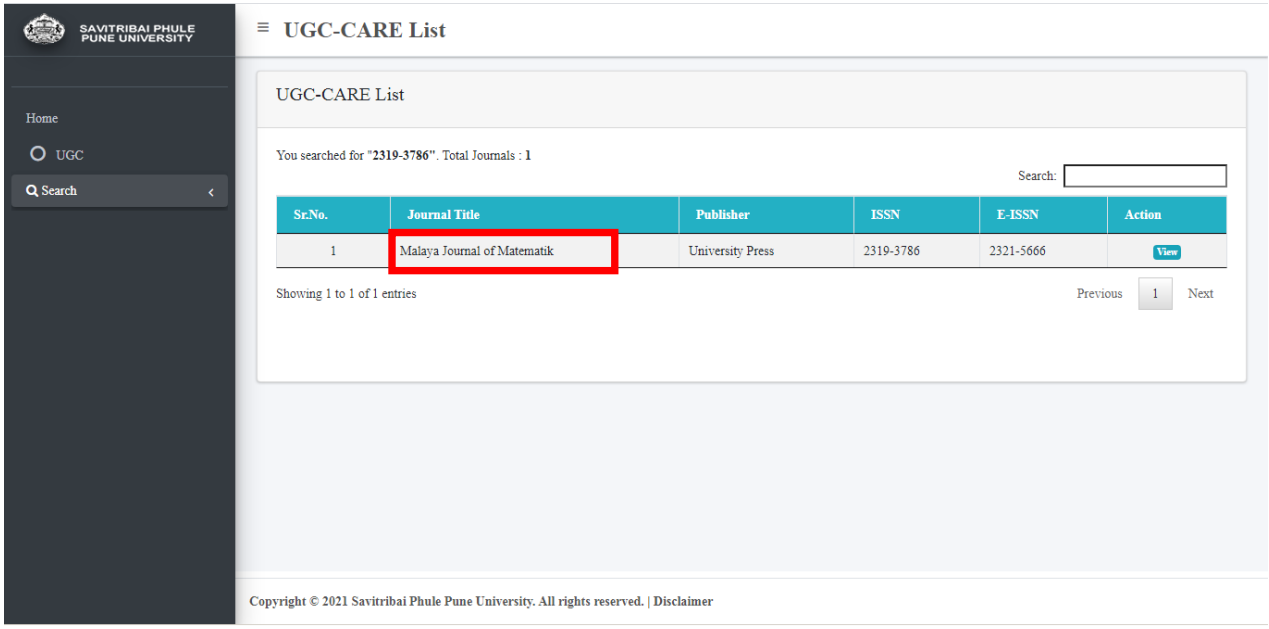

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Evolutionary algorithm for the bi-objective green vehicle routing problem with time windows

V. Bugcy Mettilda[1]* and N. Meenal[2]

Abstract

The optimization of bi-objective vehicle routing problem has become a research hotspot in recent decades. In this paper, the bi-objective vehicle routing problem with time windows [BO-VRPTW] is proposed based on the existing research and a bi-objective mathematical model is formulated. This work gives focus on a bi-objective VRPTW to minimize both total distance and time balance of the routes. The main objective of this paper is to find the lowest –cost set of routes to deliver demand using identical vehicles with limited capacity to customers with fixed service time windows. This algorithm is applied for a publicly available set of benchmark instances, resulting in solutions which are better than others previously published.

Keywords

Vehicle Routing Problem with time windows, Bi-objective optimization, Evolutionary Algorithm, Genetic Algorithms.

AMS Subject Classification

90B06, 90C29, 68W50.

[1,2] *Department of Mathematics, JJ College of Arts and Science Autonomous, [Affiliated to Bharathidasan University, Tiruchirappalli-620024, India.] Pudukkottai-622422, Tamil Nadu, India.*

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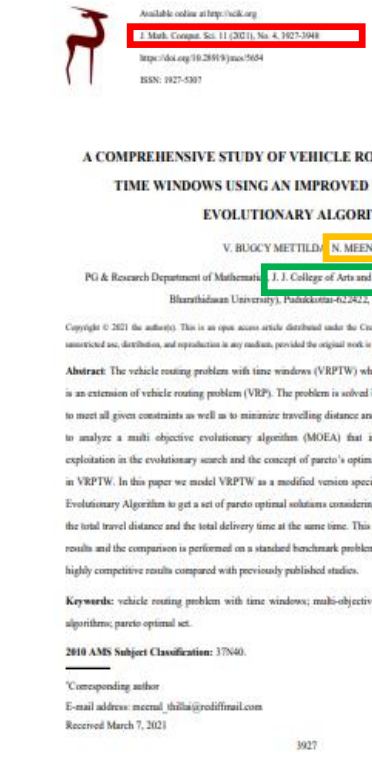

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A COMPREHENSIVE STUDY OF VEHICLE ROUTING PROBLEM WITH TIME WINDOWS USING AN IMPROVED MULTI-OBJECTIVE EVOLUTIONARY ALGORITHMS

V. BUGCY METTILDA, N. MEENAL*

PG & Research Department of Mathematics, J. J. College of Arts and Science (Autonomous), (Affiliated to Bharathidasan University), Pudukkottai-622422, Tamilnadu, India

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Abstract: The vehicle routing problem with time windows (VRPTW) which has both capacity and time constraints is an extension of vehicle routing problem (VRP). The problem is solved by optimizing routes for the vehicles so as to meet all given constraints as well as to minimize travelling distance and number of vehicles. This paper proposes to analyze a multi objective evolutionary algorithm (MOEA) that incorporates Various heuristics for local exploitation in the evolutionary search and the concept of pareto's optimality to solve multi objective optimization in VRPTW. In this paper we model VRPTW as a modified version specialized for a multi objective context, using Evolutionary Algorithm to get a set of pareto optimal solutions considering three objectives, the number of vehicles, the total travel distance and the total delivery time at the same time. This new approach is validated with very good results and the comparison is performed on a standard benchmark problems showing that the algorithm outperforms highly competitive results compared with previously published studies.

Keywords: vehicle routing problem with time windows; multi-objective optimization; evolutionary optimization algorithms; pareto optimal set.

2010 AMS Subject Classification: 37N40.

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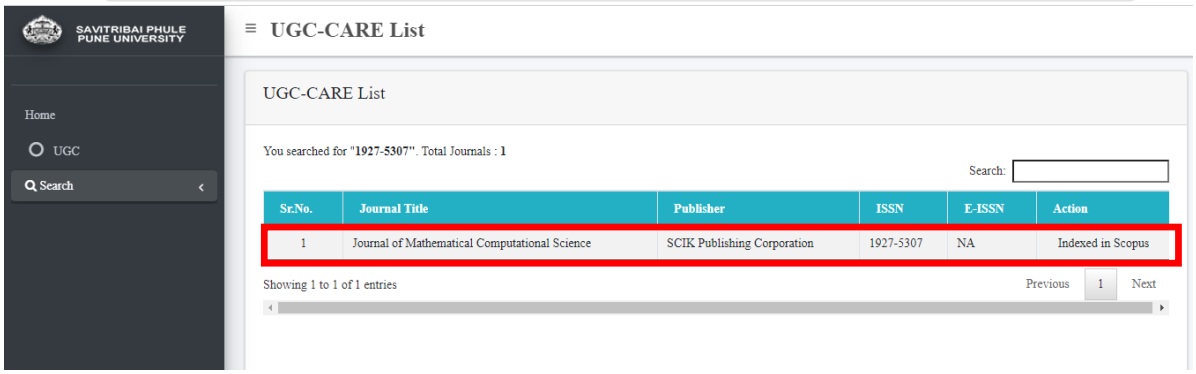

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