**Nano Open MapIn Nano Topological spaces**

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ABSTRACT

In this paer we are going to establishing new class of function in named as . The properties of is explained. Also introduce and discussed their properties. Finally introduce and analyze their properties with examples.

Keywords— sets; Sets; ; ;.

# INTRODUCTION

In the year 2013 a new branch of topology called Nano topology established by Lellis Thivagar[].Nano topology became the important branch in topology that uses in data analysing and many real life situation.He also defined some weaker form of sets[2] such as , and . He also defined andJackson and Gnanaselvam jude defined set using the operators Nscl and Nint. In this paper a new class of function named as established and their properties are discussed.

**II.PRELIMNERIES**

On this paper, and are non empty ,finite universes; and ; and are the families of equivalence relations and respectively on and .and are the with repect to and respectively. ,and are the with repect to and respectively.,and are the with repect to and respectively.

**Definition 2.1 [2]**

Take the universe be a nonempty finite set object and is known as the indiscernibility relation and is an equivalence relation on . It is known that elements of the same equivalence class are indistinguishable from one another. The approximation space is the pair . Let

1.The Lower approximation of with respect to is defined by

LR(P)

2. The upper approximation of P with respect to R is defined by

3. The boundary region of with respect to classified by

.

**Proposition 2.2: [2]**

As ) is an approximation space and ,

and

UR( ∩ ) ⊆ UR() ∩ UR()

LR( ∪ ) ⊇ LR() ∪ LR()

LR( ∩ ) = LR() ∩ LR()

and whenever

and

## **Definition 2.3 [2]**

Let be finite, non-empty universe of objects and be an equivalence relation on . Let . Let . Then a topology on , called as the with respect to . Elements of the are known as the sets in and is called the (briefly ). is called the on . Elements of are called as sets.

**Remark 2.4 [2]**

The basis for the with respect to is given by .

**Definition 2.5 [2]**

If is a with respect to where and if then the Nano interior of is defined as the union of all subsets of and it is denoted as . Nano interior is the largest subset of .The of is defined as the intersection of all sets containing and it is denoted by . It is the smallest set containing .

**Definition 2.6 [7]**

A subset of a ,  is called if . The collection of all sets in is denoted by .The complement of set is called a  set. The collection of all sets in is denoted by .

**Definition 2.7[3]**

Let and be two . Then a mapping is said to be

(i) if is in for every set in .

(ii) if is in for every set in .

(iii) Nano if ) is in for every set in .

(iv) if is Nano in for every set in .

(v) if is in for every set in .

**Definition 2.8[3]**

A function is a if the image of every set in is in . The mapping is said to be a if the image of every set in is in .

**Definition 2.9[3] :** A function is said to be a if

1. is and
2. is
3. is

**III.**

**Definition 3.1**.

The map is said to be if the the image of every set in is in .

**Example 3.2.**

Let with and . Then the topology .Let with and . Then the topology and .Define as ,then Therefore f is .

**Remark 3.3.**

The composition of two s need not be as seen by the example below.

**Example 3.4.**

Let with and . Then the topology .Let with and. Then the topology , . Let with and . Then the topology .

Let and be an identity maps then and are s. But their composition is not since image of the set is not in .

**Remark 3.5.**

Image of a set need not be a set under a .

**Example 3.6 .**

Let with and then and . Let with and then . Define as . Then is but the image of sets is not in .

**Theorem 3.7.**

Every is .

**Proof.** Let be . Let be in the topological space . Then the image of under the map is in the topological space . Since every is , is .

**Remark 3.8.**

The coverse of the theorem 3.7 is not true.

**Example 3.9.**Let with and . Then the topology . Let with and . Then the topology and . Define as . Then is but not . Since the image of set is not in .

**Theorem 3.10.**

Let be and be . Then their composition is .

Let be set in . Then is in and is since is . Hence the composition is .

**Remark 3.11.**

Let be and be . Then their composition is not .

**Example 3.12.**

In example 3.4 is and is but their composition is not .

**IV.**

**Definition 4.1.**

The map is said to be if the the image of every set in is in .

Let with and . Then the topology.Let with and . Then the topology and .Define as ,then is .

**Remark 4.3.**

The composition of two s need not be as seen by the example below.

**Example 4.4.**

Let with and . Then the topology .Let with and . Then the topology } and **.** Let with and . Then the topology . Let and be an identity maps then and are s. But their composition is not since image of the set {} is not in .

**Remark 4.5.**

Image of a set need not be a set under a .

**Example 4.6.**

Let with and then and . Let with and then . Define as . Then is but the image of set is not in .

**Theorem 4.7.**

Every is .

**Proof.** Let be . Let I be in the topological space . Then the image of under the map is in the topological space . Since every is , is .

**Remark 4.8.**

The coverse of the theorem 4.7 is not true.

**Example 4.9.**

Let with and . Then the topology .Let with and . Then the topology and . Define as . Then is but not . Since the image of set is not closed in

**Theorem 4.10.**

Let be and be . Then their composition is .

**Proof.** Let be set in . Then is in ) and is since is . Hence the composition is .

**Remark 4.11.**

Let be and be . Then their composition is not .

**Example 3.12.**

In example 3.4 is and is but their composition is not .

**V.**

**Definition 5.1.**

A function is said to be if is and , and .

**Example 5.2.**

Let with and then .Let with and . Then the topology .Define as , then is , and also is and .

**Remark 5.3.**

A function is said to be if is and , and .

**Theorem 5.4.**

Every is

**Proof.** Let be a . Then is and , and . Since every is and every is , is .

**Theorem 5.7.**

Let be a bijective . Then the following are equivalent.

1. is an map.
2. is an
3. is an map

**Proof.**

Let is an map and given is bijective and function. Then by definition, is

Sice is it is bijective, and map. Let be a set in . Then is in and is in. is . Hence is set in .

Let be set in Then is in (i.e) is in . Therefore is.

**VI.CONCLUSION**

In this paper we delivered a and as a weaker form of function in Nano Toplogical spaces and also defined and detailing thier properties with the suitable examples.

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