A Study of Mathematical Analytical Topology Application over Computer Network Systems

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ABSTRACT

“Arrangement of members” is called topology in mathematical term topology refers as space, in computer science scalability or arrangement of systems is called topology. Here we analyze the common methodology of topology application in mathematical field over the computer network systems. Topology, scalability or elasticity the system of networks over computer science. In mathematical term as topology refer as space in set theory " ∈ " (belongs to) refer set content may have no of subsets in superset. In computer networks based on computer systems topology arrangements scheme like bus, star, ring are available.

KEY WORDS: Topology, network, various topology model, application, ring, mesh.

1. INTRODUCTION

Topology, which means in mathematical term referred as the mathematics of continuity or rubber sheet geometry. Sometimes it refers as the theory of abstract topologies spaces. Geometry Organization or with elasticity topological space. Geometry way of arrangements in variety of different situations.

Basic Definition of Topology: A topological space is a pair (X, T) where X is a set and T is a family of X (Called the topology of X) whose elements are called open sets such that;

a. $\varphi, X\epsilon T$(the empty set and X itself are open)

b. If $\{O_a\}$ a ∈ A⊂Tthen $U_a \in AO_a \in T$ for any set A (the union of any number of open sets is open)

c. If $\{O_i\}_{i=1}^{k}$⊂T, then $\cap_{i=1}^{k} O_i \in T$ (the intersection of a finite number of open sets is open) If $x \in X$, then an open set containing x is said to be an (open) neighborhood of x. We will usually omit T in the notation and will simply speak about a “topological space X” assuming that the topology has been described. The complements to the open sets O∈ T are called closed sets

Literature survey: The network topologies mainly for arrangement of various computer physical element like node, links such a view. Basically network topology is the topological network structure. In mathematics topology is concerned with the connectedness of objects which is the most basic properties of space.In simple way network topology to the way in which the computer networks and connected.

The begining of topology by Euler, in 1736 Euler published a paper on the solution of the “konigsberg bridge problem entitled solutions problemetics ad geometriam situs pertinentis” as “the solution of problem releting to the geometry of position”. “A graph has a path traversing each edge exactly once if exactly two vertices have odd degree. V-e+f=2, where V is number of vertices of polyhedron,e is number of edges,f is number of faces.

Later Jordan introduced method for examining the connectivity of a surface.He called a simple closed curve on a surface and which doesnot intersect itself an irreducible circuit.If a general circuit ‘C’ can be transformed into a system of irreducible ccircuits a1, a2,…an. So that C describes aimi times then C=m1a1 + m2a2 +…..+ mnan. If the circuit is reducible if, m1a1+m2a2….+mnan=0.

A system of irreducible circuits a1, a2…an is called independent if they satisfy no relation of the form (*) and complete if any circuit can be expressed in terms of them. Jordan proved that the number of circuits in a complete independent set is a topological invariant of their surface. Etymology of topological sorting. Topology means it’s a geometical arrangements.

Mathematical Topology: Topology, its concerned of properties of space that are preserved under continuous deformations, such as stretching and bending. this can be studied by collecting of subsets is called open sets that satisfies the certain properties turning the given set into what B known as a “topological space”.

Topology application in various field such as geometry and set theory in the mathematical application. Through these analysis of concepts such as space, dimensions, and transformation. Topology is arrangements of geometry system and which has many subfields.

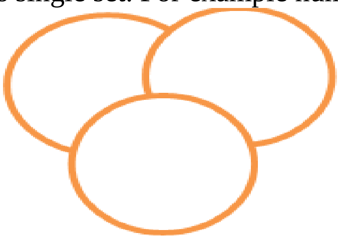
General Topology: It is also called point set topology establishes the foundational aspects of topology and investigates properties of topological spaces and concepts inherent to topological space S.

Algebraic Topology: Algebraic topology used for measuring degrees of connectivity using algebraic such as homology and homotopy groups.

Differentiable Topology: Differentiable functions on differentiable manifolds. It is closed to differential geometry.

Geometric Topology: Geometric topology primary studies of manifolds and their embeddings in other manifolds. A particular active area is low dimensional topology, which studies manifolds of four or fewer dimensions. Includes in knot theory.

Topology over Mathematical: In mathematical term as topology refers it is a space, we can made a number of members of the particular set or can refer as single set. For example number of subsets can be refer as single set.



Ex.Three factorial knot

EX: A ∈B, A ∈C, i.e, A ∈{B,C}, Hence mathematical term as called space.

Algebra is a branch of mathematics that uses letters of the alphabet to represent objects, numbers or even group of numbers or expressions. It's a mathematical notation to simplify complex or very large terms. Topology refers as "the study of locality" in 1736, Leonhard Euler solved the problem of seven bridges of Konigsberg, current vocabulary "topology" when replaces the "qualitative geometry" was invented by Johann Benedict in 1882.

The topological properties inherent to "spaces" which are invariant under homeomorphisms. The use of tools of algebra to study the topological spaces, homotopy and homology. Computing a real number is about affirming its locality.

$$f \longrightarrow g, \text{ Then, } B_f \longrightarrow B_g$$

Computing a real number is about affirming its locality. Affirmable observation is one of finite nature (i.e) one that takes finite time finite steps, Let us begin computing the value of real number, EX: a = $\sqrt{2}$.

An affirmable observation, involved in calculation of $\sqrt{2}$, is just one which affirms the locality of $\sqrt{2}$. Affirmable observation, the closed intervals $[a_n, b_n]$s, Hence $[a_n, b_n]$s are not affirmable observation themselves, Cannot affirm boundary points but, Can give affirmable observation.

Affirmable observation is one which can be used to affirm the locality (or some property) of a number (data point) (i.e.) properties which can be affirmed by an affirmable observation are formed as affirmable properties. An open internal with rational end points.

$$(r, s) := \{ x \in R \,/\, r < x < s \}$$

Is an affirmable observation of real numbers. Affirmable observations is to think of a rest or experiment carried out to test some property.

EX: Let us begin with a space of data points as 'X' which we wish to make observation. Given a point $x \in X$ there is always one trivial observation of it.

The entire space x is an affirmable observation. The following are two extreme possible affirmable observations; a) The entire space x and b) Empty set Φ.

So, $U_i \in l$, U_i is an affirmable observation. Then the arbitrary intersection of affirmable observation not be a affirmable $U_1 \cap U_2 U_3 \cap \ldots\ldots$

Theorem: Let T be a collection of affirmable observation s available on a space x of data, then we have, Both φ& x are members of T for any collection.

$$\{U_i \,/\, i \in l\} \subseteq T, \text{ it holds that } \underset{i \in l}{U} U_i \in T$$

For any U and V ∈ T , U ∩ V ∈ T

Definition: Let T be a collection of subset of a set X suppose we have Both φ& x are members of T for any collection.

$$\{U_i \,/\, i \in l\} \subseteq T, \text{ it holds that } \underset{i \in l}{U} U_i \in$$

For any U and V ∈ T , U ∩ V ∈ T, We say that T is a topology on X.

Opens as function: An affirmable observation as a computer program P trying to affirm and certain property U for a given data point $x \in X$ where,

a) P must be a finite nature,
b) P needs to affirm that X satisfies U if and only if X satisfies it.
c) P is not obliged to return a negative answer in the event that it cannot affirm that X satisfies U.

Such a test program P: X >Σ. Meets the following specification;

$$P(X) = \begin{cases} 1 & if\ x \in U\,; \\ 0 & otherwise \end{cases} \qquad \text{Here } \Sigma = \{0,1\}$$

But affirm only requires to affirm a truth, but never obliged to affirm falsehood.

Definition: The only affirmable observation present in the space Σ are Φ, {1} and Σ, this special topology space is termed a “Sierpinski’s space”.

Theorem: Let P be a program used to affirm a property U then, U = p^{-1} (1) [P is a semi decision]. A property or observation is affirmable if and only if it can be realized by a semi decision. Since the only non-trivial open in Σ is {1}, it follows that U ∈ σx <=> X U ∈ [X > Σ], where [X > Σ] is the collection of functions ‘f ’for which f^{-1} (U) for all open sets in Σ.

Topology via computation: Diagrammatic illustration of an open set.

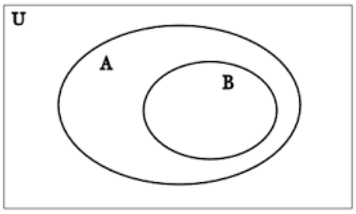
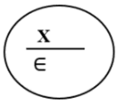


Fig.1. Open set space topology

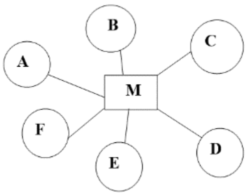
The topology surviving as synthetic or operational topology. Affirmable observation is one of finite nature (i.e) one that takes finite time finite steps.



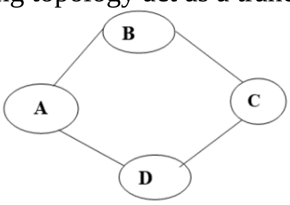
Topology over Computer System: In computer network, “geometrical arrangement of the system” is called topology, way of organising the system is called topology. There are lot of topologies available such star topology, ring, bus topology.

Bus Topology: Bus topology refers common channelis used for netwok communication. The nodes may be two or more nodes can participate using single common bus.While using these topology causing one major problem is if the channel get affect than the whole network channel will be a trouble.

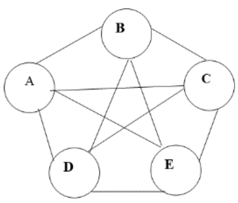
Star Topology: Central hub will act as a master,then remaining nodes as a slave because what are communication in the network,that will pass from the central hub. One slave node wants passing message to another node, that slave will send to master then the master will send to the next slave. The main difference of star topology and bus topolgy is dedicated connection channel bus for each node not using common path or channel. M – Master A, B, C, D, E, F – Slave nodes.



Ring Topology: Ring topology, the data passing as closed loop design. Number of nodes are connected as ring and passing data in the circle. Each node of the ring topology act as a tranceiver as reciving and transmitting the data.



Mesh Topology: All the systems are interconnected in dedicated path, so any system can communicate to any other system. Direct communication is possible.



2. CONCLUSION

This project mainly for topology design of mathematical application over computer networks system. This analysis will provide clear vision towards the mathematical application in interdisciplinary systems such as computer technology, electerical circuits system, etc. This project provide the analysis of mathematical topology application over computer network design topology.

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