International Journal of Statistics and Applied Mathematics

ISSN: 2456-1452
Maths 2021; 6(1): 145-147

www.mathsjournal.com
Received: 19-11-2020
Accepted: 23-12-2020

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Mathematical modelling on topological space by networking

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Abstract
The objective of this presentation is to discover a new concept of One-way Function which is apply on computer network by Mathematical modelling on topological space that easy to analyse a result without facing error.

Keywords: Topological space, network, model, graph

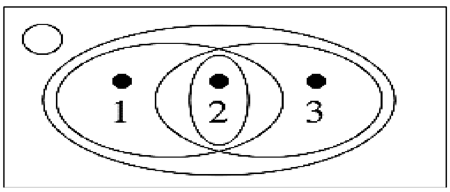
Introduction

Topology is one of the mathematical branches which studies properties of the spaces that are invariant under any deformation. It is sometimes called “rubbersheet geometry” because of the objects can be stretched and contracted like rubber, but cannot be broken. For example, a square can be deformed into a circle without breaking it. Hence, a square is topologically equivalent to a circle. A topological space is a set endowed with a structure, called a topology, which allows defining continuous deformation of subspaces, and all kinds of continuity. Euclidean spaces and metric spaces are examples of a topological space. The deformations that are considered in topology are homeomorphisms. A property that is invariant under such deformations is a topological property. Basic examples of topological properties are: the dimension, compactness, connectedness and separation axioms. Topological concepts have been powerful method and useful tools to study computer science, information systems, rough multisets, rough topology (nano topology), soft topology, multi topology, etc.

Topological space

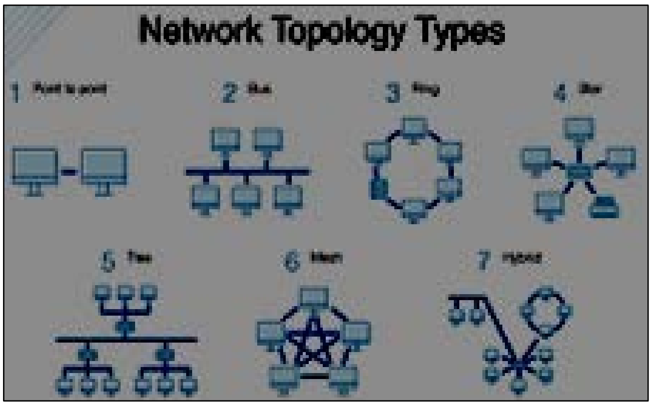
Let X be a non-empty set, T- Collection of subset of X
Then following conditions satisfied:
1) $\emptyset \in T, X \in T$
2) Intersection of finite number of members of T also $\in$ T.
$G \in T, H \in T$ then $G \cap H \in T$
3) Union of any number of member of T should also $\in$ T.
i.e. $G\lambda \in T, \lambda \in A$ (A is arbitary element)
$\bigcup : G\lambda \in T$

A set *X* where a topology has been specified in a Topological Space.
The study of geometrical properties and spatial relations unaffected by the continuous change of shape or size of figures.



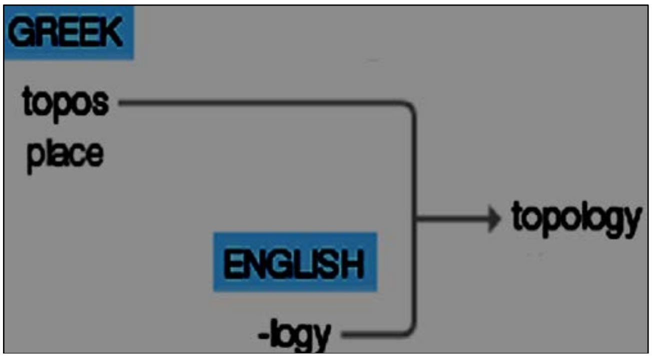
Network topology

Network topology is the arrangement of the elements (links, nodes, etc.) of a communication network. Network topology can be used to define or describe the arrangement of various types of telecommunication networks, including Command and Control Radio Networks, Industrial field busses and Computer Networks.



Topology

The path in which parts of something are organized, arrange or connected.



Types of topology

Physical topology

- The physical topology is the way you physically lay out the network, like a map and the logical topology is the way in which the information flows on the network.

Usually, the physical and logical topology is the same, but sometimes they can differ, such as in a physical star/logical ring topology.

Logical topology

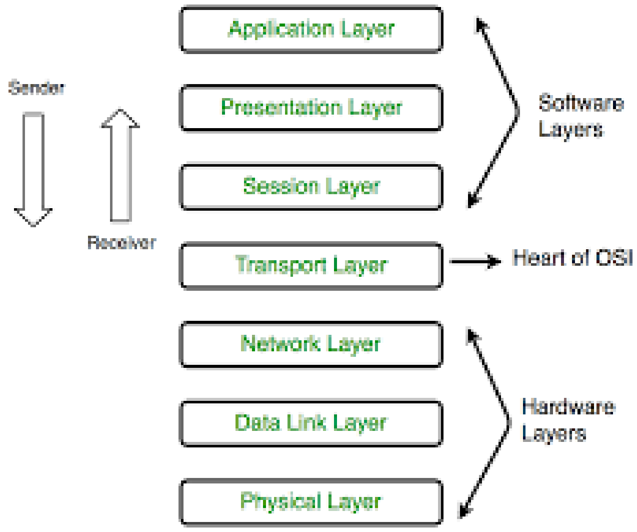
- A logical topology is a concept in networking that defines the architecture of the communication mechanism for all nodes in a network.

Using network equipment such as routers and switches, the logical topology of a network can be dynamically maintained and reconfigured.

Logical topology

OSI model (open system interconnection)

- In the late 1970s, the International Organization for Standardization (ISO) conducted a program to develop general standards and methods of networking. A similar process evolved at the International Telegraph and Telephone Consultative Committee. Both bodies developed documents that defined similar networking models.
- The OSI model was first defined in raw form in Washington, DC in February 1978 by Hubert Zimmermann of France.
- The Open Systems Interconnection model (OSI model) is a conceptual model that characterizes and standardizes the communication functions of a telecommunication or computing system without regard to its underlying internal structure and technology.



Graph discrimination by topological space

- Graphs are the basic subject studied by graph theory. The word "graph" was first used in this sense by James Joseph Sylvester in 1878.
- In Mathematics and more specifically in graph theory, a graph is a structure amounting to a set of objects in which some pairs of the objects are in some sense "related". The objects correspond to mathematical abstractions called *vertices* (also called *nodes* or *points*) and each of the related pairs of vertices is called an *edge* (also called *link* or *line*). Typically, a graph is depicted in diagrammatic form as a set of dots or circles for the vertices, joined by lines or curves for the edges. Graphs are one of the objects of study in discrete mathematics.
- The edges may be directed or undirected.

For example,

If the vertices represent people at a party, and there is an edge between two people if they shake hands, then this graph is undirected because any person *A* can shake hands with a person *B* only if *B* also shakes hands with *A*. In contrast, if any edge from a person *A* to a person *B* corresponds to *A* admiring *B*, then this graph is directed, because admiration is not necessarily reciprocated. The former type of graph is called an undirected graph while the latter type of graph is called a directed graph.

One-way function

- A one-way function is a mathematical function that is significantly easier to compute in one direction than in the opposite direction.
- Informally, a function f is a one-way function if

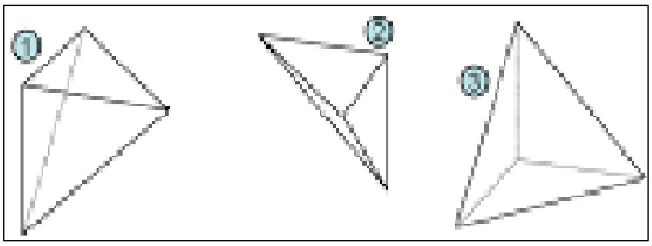
1. The description of f is publicly known and does not require any secret information for its operation.
2. IF x, it is easy to compute f(x).
3. IF y, in the range of f, it is hard to find an x such that f(x)=y.

More precisely, any efficient algorithm solving a P-problem succeeds in inverting f with negligible probability.

Definition [T1]: A graph G is a pair (V, E) or (V(G), E(G)), where V is a non-empty set called vertices or nodes and E is 2-element subsets of V called edges or links.

Definition [T2]: A directed graph (or digraph) D is a finite nonempty set of objects called vertices together with a (possibly empty) set of ordered pairs of distinct vertices of D called arcs or directed edges. For vertices u and v in D, an arc (u, v) is sometimes denoted by writing u → v (or v ← u). An undirected graph is a graph which cannot contain directed edge.

Example: Let G=(V, E) be a directed graph as shown in Figure (4D view directed).



- **Definition [T3]:** If u v is an edge of G, then u and v are adjacent vertices.

Two adjacent vertices are referred to as neighbors of each other. If u v and v w are distinct edges in G, then u v and v w are adjacent edges. The vertex u and the edge u v are said to be incident with each other.

- Definition [T4]. If the two graphs are G1=(V(G1), E(G1)) and G2=(V(G2), E(G2)), where V(G1) and V(G2) are disjoint, then their union G1 ∪ G2 is the graph with the vertex set V(G1) ∪ V(G2) and edge family E(G1) ∪ E(G2).
- Result = accuracy at LAN, but for WAN sometimes error shows.

Conclusions

One-way Function which is apply on computer network by Mathematical modelling on topological space that easy to analyse a result without facing error.

- 99% accuracy in result.
- Save time.
- Reduce man power.

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