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To improve the efficiency of mobile computing device and their implementation in mobile communication network

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ABSTRACT

A router examines a destination IP address of a given data packet, and it uses the headers and forwarding tables to decide the best way to transfer the packets between the networks. As we have studied that use of Dijkstra and warshal's algorithms, which is a classical solution of graph theory this algorithm we can use as a protocols in router devices. A large and massive computer networks, this would be become fail or too slow, because of heavy rush of load traffic in the communication network. Highway –node routing is associated in both the directions with hierarchical approach. This technique is conceptually effortlessness and quick processing, which allows the implementation of update routines that are able to react in fast processing manner like traffic jams.

Keywords: Shortest path, Network ,Computing, router etc.

2. INTRODUCTION

Computer traffic jam problem is not single day or once in a week problem; it will be possible in daily life. So, its suggested or computing to choose a best optical path from source to destination in best possible way.

For the service provider, the developing process becomes a difficult balancing act between speed and sub optimality of the computed routes.

It is composed of three parts, the targets - objects or phenomena in an area; the data acquisition - through certain instruments; and the data analysis - again by some devices.

This definition is so computer that the vision system of human eyes, sonar sounding of the sea floor, ultrasound and x-rays used in medical sciences, laser probing of atmospheric particles, and are all included. The target can be as big as the earth, the moon and other

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planets, or as small as biological cells that can only be seen through microscopes.

3. ROUTER

A router is a device that connects two or more packet-switched networks or sub networks. It serves two primary functions: managing traffic between these networks by forwarding data packets to their intended IP addresses, and allowing multiple devices to use the same Internet connection.

There are some popular companies that develop routers; such are **Cisco**, **3Com**, **HP**, **Juniper**, **D-Link**, **Nortel**, etc. Some important points of routers are given below:

- A router is used in **LAN** (Local Area Network) and **WAN** (Wide Area Network) environments. For example, it is used in **offices** for connectivity, and you can also establish the connection between distant networks such as from **Bhopal** to
- It shares information with other routers in networking.
- It uses the routing protocol to transfer the data across a network.
- Furthermore, it is more **expensive** than other networking devices like switches and hubs.
- A virtual router runs on commodity servers, and it is packaged with alone or other network functions, like load balancing, firewall packet filtering, and wide area network optimization capabilities.

4. WHY ROUTERS?

A router is more capable as compared to other network devices, such as a hub, switch, etc., as these devices are only able to execute the basic functions of the network. For example, a hub is a basic networking device that is mainly used to forward the data between connected devices, but it cannot analyze or change anything with the transferring data. On the other hand, the router has the capability to analyze and modify the data while transferring it over a network, and it can send it to another network. For example, generally, routers allow sharing a single network connection between multiple devices.

5. HOW CAN ROUTER WORK?

A router analyzes a destination IP address of a given packet header and compares it with the

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routing table to decide the packet's next path. The list of routing tables provides directions to transfer the data to a particular network destination. They have a set of rules that compute the best path to forward the data to the given IP address.

Routers use a **modem** such as a cable, fiber, or DSL modem to allow communication between other devices and the internet. Most of the routers have several ports to connect different devices to the internet at the same time. It uses the **routing tables** to determine where to send data and from where the traffic is coming.

A routing table mainly defines the default path used by the router. So, it may fail to find the best way to forward the data for a given packet. For example, the office router along a single default path instructs all networks to its internet services provider.

There are two types of tables in the router that are **static and dynamic**. The static routing tables are configured manually, and the dynamic routing tables are updated automatically by dynamic routers based on network activity.

6. FEATURES OF ROUTER

- Routers' main components are central processing unit (CPU), flash memory, RAM, Non-Volatile RAM, console, network, and interface card.
- Routers are capable of routing the traffic in a large networking system by considering the sub-network as an intact network.
- Routers filter out the unwanted interference, as well as carry out the data encapsulation and decapsulation process.
- Routers provide the redundancy as it always works in master and slave mode.
- It allows the users to connect several LAN and WAN.
- Furthermore, a router creates various paths to forward the data.

7. APPLICATIONS OF ROUTERS

There are various areas where a router is used:

- Routers are used to connect hardware equipment with remote location networks like **BSC, MGW, IN, SGSN**, and other servers.
- It provides support for a fast rate of data transmission because it uses high STM links for connectivity; that's why it is used in both wired or wireless communication.

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- Internet service providers widely use routers to send the data from source to destination in the form of e-mail, a web page, image, voice, or a video file. Furthermore, it can send data all over the world with the help of an IP address of the destination.
- Routers offer access restrictions. It can be configured in a way that allows for few users to access the overall data and allows others to access the few data only, which is defined for them.
- Routers are also used by software testers for WAN communications. For example, the software manager of an organization is located in Agra, and its executive is located at a different place like Pune or Bangalore. Then the router provides the executive the method to share his software tools and other applications with the manager with the help of routers by connecting their PCs to the router using WAN architecture.

8. TYPES OF ROUTERS

There are various types of routers in networking; such are given below:

8.1. WIRELESS ROUTER: Wireless routers are used to offer Wi-Fi connectivity to laptops, smart phones, and other devices with Wi-Fi network capabilities, and it can also provide standard Ethernet routing for a small number of wired network systems.

Wireless routers are capable of generating a wireless signal in your home or office, and it allows the computers to connect with routers within a range, and use the internet. If the connection is indoors, the range of the wireless router is about 150 feet, and when the connection is outdoors, then its range is up to 300 feet.

8.2. BROUTER: A brouter is a combination of the bridge and a router. It allows transferring the data between networks like a bridge. And like a router, it can also route the data within a network to the individual systems. Thus, it combines these two functions of bridge and router by routing some incoming data to the correct systems while transferring the other data to another network.

8.3. CORE ROUTER: A core router is a type of router that can route the data within a network, but it is not able to route the data between the networks. It is a computer communication system device and the backbone of networks, as it helps to link all network devices. It is used by internet service providers (ISPs), and it also provides various types of fast and powerful data communication interfaces.

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8.4. EDGE ROUTER: An edge router is a lower-capacity device that is placed at the boundary of a network. It allows an internal network to connect with the external networks. It is also called as an access router. It uses an External BGP (Border Gateway Protocol) to provides connectivity with remote networks over the internet.

There are two types of edge routers in networking:

- **Subscriber edge router**
- **Label edge router**

The **subscriber edge router** belongs to an end-user organization, and it works in a situation where it acts on a border device.

The **label edge router** is used in the boundary of Multiprotocol Label Switching (MPLS) networks. It acts as a gateway between the LAN, WAN, or the internet.

9. BROADBAND ROUTERS: Broadband routers are mainly used to provide high-speed internet access to computers. It is needed when you connect to the internet through phone and use voice over IP technology (VOIP). All broadband routers have the option of three or four Ethernet ports for connecting the laptop and desktop systems. A broadband router is configured and provided by the internet service provider (ISP). It is also known as a **broadband modem**, asymmetric digital subscriber line (**ADSL**), or digital subscriber line (**DSL**) modem.

10. BENEFITS OF ROUTER

There are so many benefits of a router, which are given below:

- **Security:** Router provides the security, as LANs work in broadcast mode. The information is transmitted over the network and traverses the entire cable system. Although the data is available to each station, but the station which is specifically addressed reads the data.
- **Performance enhancement:** It enhances the performance within the individual network. For example, if a network has 14 workstations, and all generate approximately the same volume of traffic. The traffic of 14 workstations runs through the same cable in a single network. But if the network is divided into two sub-networks each with 7 workstations, then

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a load of traffic is reduced to half. As each of the networks has its own servers and hard disk, so fewer PCs will need the network cabling system.

11. USES OF ROUTING PROTOCOLS

Routing protocols specify a way for the router to identify other routers on the network and make dynamic decisions to send all network messages. There are several protocols, which are given below:

11.1 Open Shortest Path First (OSPF): It is used to calculate the best route for the given packets to reach the destination, as they move via a set of connected networks. It is identified by the Internet Engineering Task Force **(IETF)** as Interior Gateway Protocol.

11.2 Border Gateway Protocol (BGP): It helps manage how packets are routed on the internet via exchange of information between edge routers. It provides network stability for routers if one internet connection goes down while forwarding the packets, it can adapt another network connection quickly to send the packets.

11.3 Interior Gateway Routing Protocol (IGRP): It specifies how routing information will be exchanged between gateways within an independent network. Then, the other network protocols can use the routing information to determine how transmissions should be routed.

12. REVIEW OF PREVIOUS WORK

When one ant finds a path from the colony to a food source, they lay down a chemical compound; known as pheromone on the ground and form a trail. If other ants find such a path, they are more likely to follow it instead of wandering randomly. This eventually leaves more pheromones and leads more ants to follow that path. The idea of ant colony algorithm is to simulate this behavior. When we apply this algorithm to VRP, the ants keep a memory about the visited nodes and the estimated time to reach them. Ant based control approach [12] has been used for searching the shortest paths in VRP as it is able to react to dynamic changes of traffic conditions. 5) Genetic Algorithms (GA): Genetic algorithms are used to solve routing search and optimization problems. GA is meta-heuristics inspired from a natural metaphor. It simulates the way species evolve and adapt to their environment, according to the Darwinian principle of natural selection. In the beginning, a randomly or heuristically population is generated. Then, this cycle is repeated for a number of

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generations. When applied to vehicle routing problems, the classical GA solution scheme is modified [11]. Since GAs always have routes in a population during a search, it is possible for the route to be reevaluated in a short time using another route in the population and the constraints regarding all amenities in driving can be reflected in search [2]. 6) Hybrid Genetic Algorithms: Kanoh et.al [13] proposed a hybrid approach which combines Genetic Algorithm with Dijkstra to solve a dynamic multi-objective problem. This algorithm finds the solution simultaneously for three objective functions: route length, travel time and ease of driving. These three categories are: optimal algorithms based approaches, heuristic based approaches and hybrid approaches.

Electro-magnetic energy is reflected, transmitted or emitted by the target and recorded by the sensor. Because energy travels through the medium of the earth's atmosphere, it is modified such that the signal between the target and the sensor will differ. Once image data are acquired, we need methods for interpreting and analyzing images. By knowing "what" information we expect to derive from remote sensing, we will examine methods that can be used to obtain the desirable information.

Many remote sensing platforms are designed to follow an orbit (basically north-south), in conjunction with the Earth's rotation (west-east), allows them to cover most of the Earth's surface over a certain period of time. These are **near-polar orbits**, so named for the inclination of the orbit relative to a line running between the North and South poles. Many of these satellite orbits are also **sun-synchronous** such that they cover each area of the world at a constant local time of day called **local sun time**. At any given latitude, the position of the sun in the sky as the satellite passes overhead will be the same within the same season. This ensures consistent illumination conditions when acquiring images in a specific season over successive years, or over a particular area over a series of days. This is an important factor for monitoring changes between images, as they do not have to be corrected for different illumination conditions.

Most of the remote sensing satellite platforms today are in near-polar orbits, which mean that the satellite travels northwards on one side of the Earth and then toward the southern pole on the second half of its orbit. These are called **ascending and descending passes**, respectively. If the orbit is also sun-synchronous, the ascending pass is most likely on the shadowed side of the Earth while the descending pass is on the sunlit side. Sensors recording reflected solar energy only image the surface on a descending pass, when solar illumination is available. Active sensors which provide their own illumination or passive sensors that record

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emitted (e.g. thermal) radiation can also image the surface on ascending passes.

As a satellite revolves around the Earth, the sensor "sees" a certain portion of the Earth's surface. The area imaged on the surface, is referred to as the **swath**. Imaging swaths for space borne sensors generally vary between tens and hundreds of kilometers wide. As the satellite orbits the Earth from pole to pole, its east-west position wouldn't change if the Earth didn't rotate. However, as seen from the Earth, it seems that the satellite is shifting westward because the Earth is rotating (from west to east) beneath it. This apparent movement allows the satellite swath to cover a **new area with each consecutive pass**. The satellite's orbit and the rotation of the Earth work together to allow complete coverage of the Earth's surface, after it has completed one complete cycle of orbits.

If we start with any randomly selected pass in a satellite's orbit, an orbit cycle will be completed when the satellite retraces its path, passing over the same point on the Earth's surface directly below the satellite (called the **nadir** point) for a second time. The exact length of time of the orbital cycle will vary with each satellite. The interval of time required for the satellite to complete its orbit cycle is not the same as the "**revisit period**". Using steerable sensors, a satellite-borne instrument can view an area (off-nadir) before and after the orbit passes over a target, thus making the 'revisit' time less than the orbit cycle time. The revisit period is an important consideration for a number of monitoring applications, especially when frequent imaging is required (for example, to monitor the spread of an oil spill, or the extent of flooding).

Rapid Train project is a combination of many related engineering field as civil engineering, Computer engineering ,Mechanical Engineering and electrical engineering etc. But here we discus about civil engineering & computer engineering related project report. Firstly we start from Railway Track/Computer. A Railway Track network can be considered as a graph (a graph is an ordered pair G = (V, E) comprising a set V of vertices or nodes or points together with a set E of edges or arcs or lines)with positive weights. The nodes represent computer junctions and each edge of the graph is associated with a computer segment between two junctions. The weight of an edge may correspond to the length of the associated computer segment, the time needed to traverse the segment, or the cost of traversing the segment. Using directed edges it is also possible to model one-way streets. All of these algorithms work in two phases. In the first phase, the graph is preprocessed without knowing the source or target node. The second phase is the query phase. In this phase, source and target node are known .The idea is that the computer network is static, so the preprocessing phase can be done once and used for a large number of queries on the same computer network.

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13. IDENTIFICATION OF RESEARCH GAP AND PROBLEM

Computer traffic jam problem is not single day or once in a week problem; it will be possible in daily life. So, its suggested or computing to choose a best optical path from source to destination in best possible way. [1] Many people frequently deal with this question when planning trips with their cars. There are also many applications like logistic planning or traffic simulation that need to solve a huge number of such route queries.

]The approach that is used by some commercial route planning systems is based on the above idea:

1. Search from the source and target node ('bidirectional') within a certain radius (e.g. 20 km), consider all computers.
2. Continue the search within a larger radius (e.g. 100 km), consider only national computers and motorways.
3. Continue the search only in motorways.

Freeway Pecking order or Highway hierarchies are the first route planning technique that was able handle the computer network of a whole continent, achieving speedups of more than a factor 1 000 compared to Dijkstra's algorithm. They offer a good compromise between preprocessing time, memory consumption, and query time. In particular w.r.t. preprocessing time, they are superior to practically any other method that achieves significant speedups.
A priority queue Q manages a set of elements with associated totally or- dered priorities and supports the following operations:

· insert – insert an element into the priority queue,

· deleteMin – retrieve the element with the smallest priority and remove it from the priority queue,

· decreaseKey – set the priority of an element that already belongs to the priority queue to a new value that is less than the old value.

Basic shortest path computer public transportation networks routing algorithms struggle with advanced routing scenarios, so there is a need to algorithmically enhance them or even to develop completely new algorithms. Computer traffic jam problem is not single day or once in a week problem; it will be possible in daily life. So, its suggested or computing to choose a best optical path from source to destination in best possible way. Many people

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frequently deal with this question when planning trips with their cars. There are also many applications like logistic planning or traffic simulation that need to solve a huge number of such route queries.

Here, two contributions in this chapter. First we will implement the idea of speed-up techniques for route planning and second is for contribute to develop a new Algorithm planning. [4] Both these algorithms will handle the fully realistic scenario. Optionally, we can apply the following reduction step to eliminate edges from Eℓ that are superfluous: for each node u ∈ Vℓ, we perform a search in ttℓ (instead of ttℓ−1) until all adjacent nodes have been settled. Other application of Dijekstra's Algorithm in shortest path route network. We can see that such type problems was seeing in meerut city that is route jam problems . So we have need route solution with the help of shortest path algorithm.

14. EXPECTED IMPACT ON ACADEMICS AND INDUSTRY

To obtain a robust implementation, we include extensive consistency checks in assertions and perform experiments that are checked against reference implementations, i.e., queries are checked against Dijkstra's algorithm and fast preprocessing algorithms are checked against naive implementation. Moreover, we created our own visualization tools [9] that can handle large graphs and are able to illustrate our route planning approaches. By this means, several possibilities for further improvements have been discovered and utilized.

It is understood that first tunnel was constructed by Egyptians and Babylonians about 4000 years ago. It was built to connect two buildings in Babylon. The length, width, and height of this tunnel were 910m, 360 cm, 450 cm respectively.¬ The methods involved are underground operations known as tunnel driving and the surface is not disturbed Tunnels are underground passages used for transportation. They could be used for carrying freights and passengers, water, sewage, etc.

In case of aerial warfare and bombing of cities, the tunnels would grant better protection as compared to bridges if tunnels are provided with easy gradients, the cost of hauling is decreased Tunnels prove to be cheaper than bridges or open cuts to carry public utility services like water, sewer and gas Tunnels avoid disturbing or interfering with surface life and traffic during construction Tunnels are more economical than open cuts be yon certain depths

1. The requirements of fill in the neighborhood also largely influence the choice. If a large amount of material is needed for the nearby fill, an open cut may be justified If the soil is hard rock, the open cut could be of steep slope, involving much less volume of excavation and may prove cheaper Nature of soil, particularly in deep cutting, with the consequent side slopes and volume of excavation In general it depends on relative cost of open tunnels.

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2. Alignment restraints: Underground space is a heterogeneous mass and in addition, problems like water table, position of fractured rocks etc. are to be tackled. A through detailed inspection and evaluation of the existing alignment restraints of underground space should therefore be made selection of route of tunnel & Environmental considerations: The site of tunnel should be selected in such a way that the least difficulty is experienced for various environmental factors such as disposal of exhaust gas, groundwater, muck, etc. correlated with the tunneling technology to be adopted for the project.

3. Full face method: The full face method is adopted only for small tunnels whose dimensions do not exceed about 3 m. The vertical columns are fixed at suitable height. A series of drill holes about 10 mm to 40 mm diameter are drilled at about 1200 mm centers. TUNNELLING THROUGH ROCK & Cantilever car dump method: This arrangement consists of two plate girders about 23 m long and fixed at 1800 mm centers.

15. FUTURE WORK AND RESEARCH PLANNING METHODOLOGY

Advanced route planning is very enormous field of research. Whenever we have some traffic jam related problem in computer network. Here we reduce them all problems and we provide the solution of shortest route in networks using suitable algorithm through the system. Here we find the optimal path or shortest route planning in computer networks, then easily we can find out the specific route after applying this algorithm. We also reduce the daily life traffic jam problem by this research and also find the shortest route for meerut city computer network using advanced technology for rapid train project & also we update technology of the delhi rapid train project in tunnel techniques with latest device for security purpose of human life. It will be done trough computer system automatically .

16. MAJOR INPUTS

The technique that is used here is well known for the classification of the crops in the world, it is known as NDVI method of classification. Here this technique is used for the land cover classification of the Meerut city for find out shortest path planning in network. It is found that this technique is a very fast and efficient method of analysis. Here we introduce basic data structures, algorithms with some notations and this notation will be used in this thesis. All the fundamental part will be covered from Graphs, but that will be used in some different directions.

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17. AIM AND OBJECTIVES

Basic aim of our study is to provide minimum safe and secure path to human life & also analyze the Remote Sensing Data that we have received from the national remote sensing agency (space department, government of India); Integrating Spectral, Temporal and Spatial Features of the Objects in the area of satellite image processing. Here the multi-spectral remote sensing data is used to find the spectral signature of different objects of the Meerut city for the land cover classification, how the use of land changes according to time and also performed the temporal analysis to analyze the impact of climate over the surface.

. During the study following objectives were achieved:

- General analysis of the different bands data of the multi spectral images.
- Determination of NDVI images from the multi spectral images.
- Determination of threshold values of NDVI for classified objects from the ground survey data.
- Creation of the False Color Composite image for the classified objects such as (vegetation, structures, computers, free land and water)
- Temporal analysis of the multi spectral image.

We introduce basic data structures, algorithms with some notations and this notation will be used in this thesis. All the fundamental part will be covered from Graphs, but that will be used in some different directions. [2]We have already studied that G=V,E, where G represents the Graphs, V is vertex and E is an edges. We expect a direct graph tt = (V, E) with a node set V of size n and an edge set $E \subseteq V \times V$ of size m as input. A weight function $w: E \rightarrow R^+$ assigns a nonnegative weight w((u, v)) to each edge (u, v). We usually just write w(u, v) instead of w((u, v)). In computer networks node generally used junctions and edges represented as computer segments. As already discussed in the starting that Dijksra Algorithm is used to **Single-Source Shortest-Path Problem.** Dijkstra's algorithm [2] can be used to solve the single-source shortest-path (SSSP) problem, i.e., to com- pute the shortest paths from a single source node s to all other nodes in a given graph. Starting with the source node s as root, Dijkstra's algorithm grows a shortest-path tree that contains shortest paths from s to all other nodes. Let us fix any rule that decides which element Dijkstra's algorithm removes from the priority queue in the case that there is more than one queued element with the smallest key. Then, during a Dijkstra search from a given node u, all nodes are settled in a fixed order. The Dijkstra rank rku(v) of a node v is the rank of v w.r.t. this order. u has Dijkstra rank rku(u) = 0, the closest neighbor v1 of u has Dijkstra rank rku(v1) = 1, and so on.

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18. ABOUT DIJKSTRA'S SHORTEST PATH ALGORITHM

Dijkstra's algorithm is one of the most popular algorithms for solving many single-source shortest path problems having non-negative edge weight in the graphs i.e., it is to find the shortest distance between two vertices on a graph. It was conceived by computer scientist Edsger W. Dijkstra in 1956 and published three years later. Dijkstra's Algorithm has several real-world use cases, some of which are as follows:

Digital Mapping Services in Google Maps: Many times we have tried to find the distance in G-Maps, from one city to another, or from your location to the nearest desired location. There encounters the Shortest Path Algorithm, as there are various routes/paths connecting them but it has to show the minimum distance, so Dijkstra's Algorithm is used to find the minimum distance between two locations along the path.

19.APPLICATIONS OF DIJKSTRA'S SHORTEST PATH ALGORITHM

The standard Dijkstra algorithm can be applied using the shortest path between users measured through handshakes or connections among them. When the social networking graph is very small, it uses standard Dijkstra's algorithm along with some other features to find the shortest paths, and however, when the graph is becoming bigger and bigger, the standard algorithm takes a few several seconds to count and alternate advanced algorithms are used.

IP ROUTING TO FIND OPEN SHORTEST PATH FIRST: Open Shortest Path First (OSPF) is a link-state routing protocol that is used to find the best path between the source and the destination router using its own Shortest Path First. Dijkstra's algorithm is widely used in the routing protocols required by the routers to update their forwarding table. The algorithm provides the shortest cost path from the source router to other routers in the network.

FLIGHTING AGENDA: For example, If a person needs software for making an agenda of flights for customers. The agent has access to a database with all airports and flights. Besides the flight number, origin airport, and destination, the flights have departure and arrival time. Specifically, the agent wants to determine the earliest arrival time for the destination given an origin airport and start time. There this algorithm comes into use.

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DESIGNATE FILE SERVER: To designate a file server in a LAN(local area network), Dijkstra's algorithm can be used. Consider that an infinite amount of time is required for transmitting files from one computer to another computer. Therefore to minimize the number of "hops" from the file server to every other computer on the network the idea is to use Dijkstra's algorithm to minimize the shortest path between the networks resulting in the minimum number of hops.

ROBOTIC PATH: Nowadays, drones and robots have come into existence, some of which are manual, some automated. The drones/robots which are automated and are used to deliver the packages to a specific location or used for a task are loaded with this algorithm module so that when the source and destination is known, the robot/drone moves in the ordered direction by following the shortest path to keep delivering the package in a minimum amount of time.

19. CONCLUSION

Study of data communication electronics router device in Computer Networks or data communication network is such a distinctive mobile computing optimal router device which is used in any computer networks and that can be come across in world applications of algorithms. The router is a physical or virtual internetworking device that is designed to receive, analyze, and forward data packets among the computer networks.

Spatial distributions of land cover types such as roads; urban area, agriculture land, and water resources can easily be interpreted by taking their Normalized difference vegetation index (NDVI). We have carried out the ground survey to obtain the threshold values of NDVI and on the basis of it we have obtained the False Color Composite (FCC) of classified objects. The classified data could be used for municipal planning and management. The long-term objective of the thesis is to optimize the land use pattern for economically and environmentally sustainable urban development.

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