

Road Network Analysis Using Geoinformatic Technique for Akola City, Maharashtra State, India

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Abstract- The urban road network plays a key role in the urban spatial structure. It is the main city social-economy activities and transportation carrier. Today, more and more researchers pay attention on road network. One of the most important problems is how to evaluate the accessibility of road network. Network Analysis aims at finding solutions to routing problems related to traversability, rate of flow, and network connectivity. It helps in identifying optimum locations for services to be provided. The city of Akola, in recent years, has expanded exponentially in all virtual directions.

Index Terms- Network data structures, Network Analysis, Geographic Information System (GIS), Topology Building, Georeferencing, Remote Sensing (RS), etc.

I. INTRODUCTION

Network data structures were one of the earliest representations in geographic information system (GIS), and network analysis remains one of the most significant and persistent research areas in geographic information science (GIScience). The Transportation System is a critical component of urban infrastructure and the lifeline of the city. It plays a key role in the economic growth of that region. It also displays region's economic condition as well as planners' dedication for their region. An efficient route planning and accessibility facilitate sustainable development. The road network in Akola is being developed and maintained by PWD (Public Works Department), AMC (Akola Municipal Corporation).

At present, data regarding road locations and their characteristics is stored within geographic databases which enable numerous Geographic Information Systems (GIS) applications. Road data enables GIS applications to facilitate a variety of services which include satellite navigation, route planning, transportation system modeling, health care accessibility planning, land cover classification and even infrastructure management. Road networks play an important role in a number of geospatial applications, such as cartographic, infrastructure planning, etc.

GIS based network analysis for the mitigation of disaster is fully GIS based information system to handle the critical situation when any disaster occurs across the Akola city. The system supports

flood, fire and accidental conditions. According to each disaster how effectively the network analysis can be utilized within short time has been tried to develop in this project.

In the network analysis system there are four departments are very actively participated those are Police Station, Fire Station, Ambulance and Hospital they are primary and essential component of this system.

II. RESERCH ELABORATION

A. Study Area:

The district of Akola lies in the western parts of the Nagpur Division of Maharashtra State and is surrounded by Amravati district in the north and north-east, Yeotmal in the south-east, Washim in the south and Buldhana in the west. The district lies between 19°51' and 21°16' latitude and 76°38' and 77°44' longitude. The two main rivers of the district are the Purna and the Penganga, the other less important rivers being the tributaries of these two rivers. They are the Katepurna, Shahanur, Morna, Mun, Nand, Man and Uma, which are the tributaries of the Purna, and the Adan, the Arna and the Pus which are the tributaries of the Penganga.

B. Data Description and Methodology:

The data used in this study can be broadly divided into four catagories: Remotely sensed data Google Earth Data, Satellite Imageries, Field collected Data, Web collected Data and GIS Datasets which are derived from satellite imageries or field survey.

C. Data Used is as follows:

1. Toposheets: - 55-D/ 15
55-H/ 2
2. Municipal Map of Akola District,
3. SRTM Satellite Image.
4. Google Earth Data.

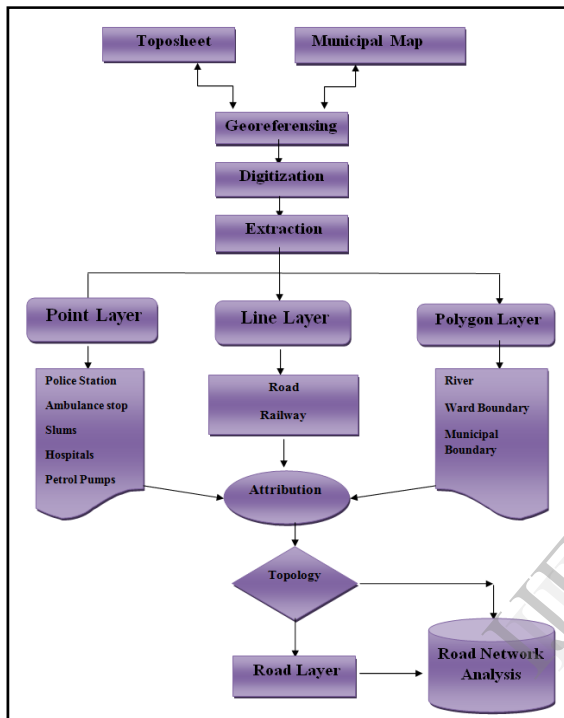
D. Use of Simulation software

The study has been implemented using ArcGIS software. Digitization, attribution, removal of topological errors, modeling of digitized data,

building of network dataset and network analysis of the data have been done with the help of ArcGIS software and its useful resources. The software used in the study as follows:-

- ArcGIS 9.2 Used for digitization, topology building and network analysis of data.
- Google Earth for downloading of data.
- MS-office tools for writing the paper, Compute Statistic, Making Charts.

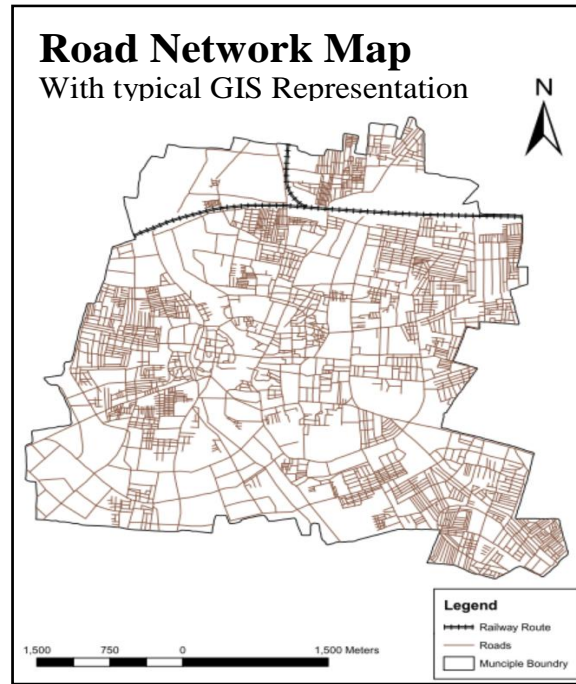
III. RESERCH METHODOLOGY



Flow Chart for Network Analysis

In this the first step comes the process of Georeferencing of all the available Data as Toposheets, Municipal DP plan, etc. After that the digitization of all the thematic layers such as Road, Railway Routes, Rivers, etc. is done. Then the process of topology building is done.

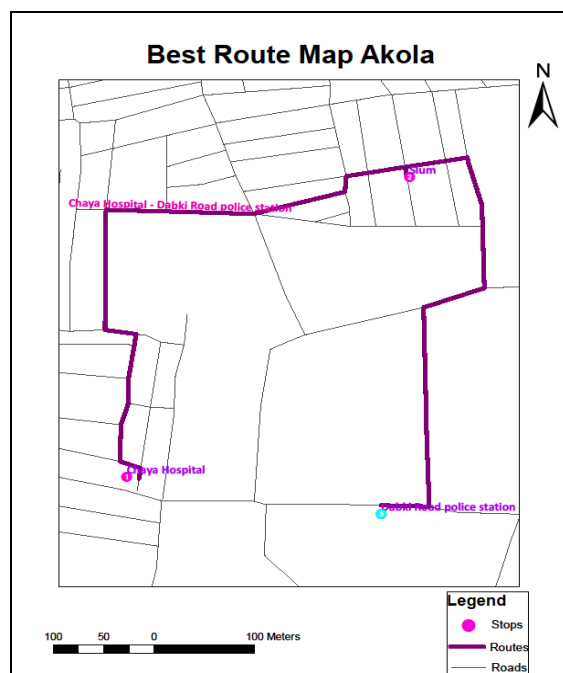
The Topology Building is the important step in GIS it is used to remove the errors from the digitised data such as overshoot and undershoot.



A. The Best Route:

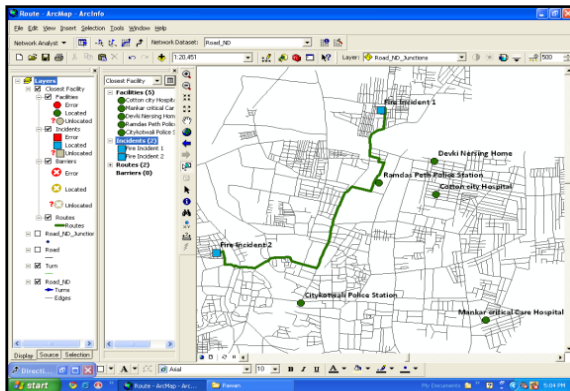
Weather finding a simple route between two locations or one that visits several locations, people usually tries to take the best route. But best route can mean different things in different situations.

The best route can be the quickest or shortest route, depending on the impedance chosen. If the impedance is time, then the best route is the quickest route. Hence, the best route can be defined as a route that has the lowest impedance, where the impedance is chosen by the user. Any valid network cost attribute can be used as the impedance when determining the best route.



B. Closest Facility:

Finding the closest hospitals to an accident the closest police cars to a crime scene and the closest store to a customer's address are all example of closest facility problem. When finding closest facilities, you can specify how many to find and whether the direction of travel is toward or away from them. Once you've found closest facilities, you can display the best route to or from them. Additionally, you can specify a cutoff cost beyond which ArcGIS Network Analyst should not search for a facility.



Finding Closest Facility

IV. CONCLUSION

A conclusion Urban growth is taking new forms characterized by heavy dependence on transportation, communication and multiple activity centers. It becomes necessary to understand the mechanisms at play to capture aspects associated with this complex process to develop frame works in the context of increasing importance of a National Urban System. The type of urban growth proliferation that witnessed today calls for policy orientations that will not only contain the practical tendencies of metropolitan growth but also integrate growth of lower order settlements with development of metropolitan areas. In this study an attempt have been made to employ recent tools and techniques associated with RS and GIS to verify a growth strategy formulated to contain metropolitan dominance and the problems associated with such phenomenon. Appropriate land use structures and compatible transport network are generated using remotely sensed data in a GIS environment.

Transport network forms an important infrastructural element of the whole urban area. It allows connectivity and movement of people, traffic and goods from both intra (within) city and inter (outside) city. The network analysis tool in ArcGIS has the facility to find out the Shortest or Best route, The Closest Facility to the incident place.

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