Analysis of Road Networks by Using Geographical Information System

S.SHIVA PRAKASH REDDY
B.Tech Student
Dept of Civil Engineering
Guru Nanak Institute Of Technology,
Hyderabad, T.S, India

KARTHIK MANDALA
B.Tech Student
Dept of Civil Engineering
Guru Nanak Institute Of Technology
Hyderabad, T.S, India

SRIPRIYA VADAPALLI
B.Tech Student
Dept of Civil Engineering
Guru Nanak Institute Of Technology
Hyderabad, T.S, India

THADURI ANUSHA
B.Tech Student
Dept of Civil Engineering
Guru Nanak Institute Of Technology
Hyderabad, T.S, India

MADHU SUDHAN REDDY.M
Assistant Professor
Dept of Civil Engineering
Guru Nanak Institute Of Technology
Hyderabad, T.S, India

Prof S.MADAN MOHAN
Professor
Dept of Civil Engineering
Guru Nanak Institute Of Technology
Hyderabad, T.S, India

Abstract: **Transportation is one of the fastest growing of several fields where Geographic Information System software is utilized. Geographic Information System in support of transportation is rising as an important tool of planning management intended for transportation professionals. Our project mainly deals with the work that has to be done on road networks of nalgonda district which is positioned in Telangana state of India. The Geographic Information System software is mostly used in road networks analysis. The project is extremely helpful in finding of traditional routes, new routes, and for finding out of shortest distances between any two places, and so on.**

Keywords: **Geographic Information System, Road networks, Shortest distances, Planning management, Transportation.**

I. INTRODUCTION

Transportation systems include streets, highways, mass transit, ports, and so on. Transportation systems move people and goods and they are related to land use, economics as well as environment. In the Transportation system, Geographic Information System is used and it is the perfect information management as well as analysis tool for lots of aspects of transportation industry that includes both public as well as private sectors. Diverse areas of transportation such as highway as well as railway infrastructure management, traffic management as well as Intelligent Transport System, transit bus and rail service planning, are applying Geographic Information System to their work. Geographic Information System is rising as an essential tool of planning management. By means of Geographic Information System in transportation field opens up an extensive range of promising applications, as diverse as field of transportation its self. A Geographic Information System can offer expensive tool for managing these objects in particularly reference context, viewing paths as a transportation network [1]. Routes as well as networks are inter connected features that are employed for transportation and comprise highways, railways, city streets, rivers transportation routes, as well as utility systems networks as an essential part of our daily life and study of these networks get better movement of people, services as well as flow of resources. A road network is the system of interconnecting lines as well as points that symbolize a system of streets for a specified area. A street network offers basis for network analysis. The analysis of road network is performed in Nalgonda district of Telangana state
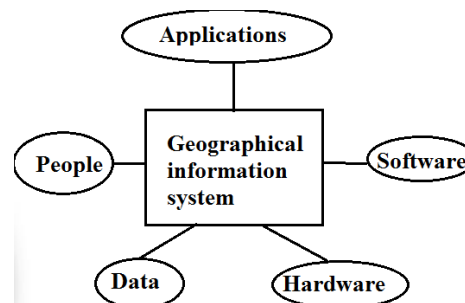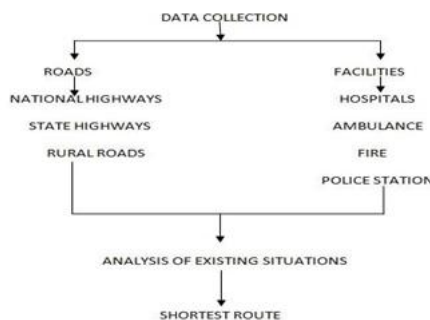

Fig: components of geographical information system

II. METHODOLOGY

Our aim is to find usage of Geographic Information System in transportation field that is finding of fastest route as well as shortest route in road network by means of application of Geographic Information System routing technology. The project is extremely helpful in finding of traditional routes, new routes, and for finding out of shortest distances between any two places, and so on. The project is carried out by means of ARC Geographic Information System software, maps of particular area, as well as Google earth. The maps of particular area are employed in Geographic Information System software and road networks are schemed by

means of some help of google earth. The project has to be done on road networks of nalgonda district which is positioned in Telangana state of India. The ARC Geographic Information System software is mostly used in road networks analysis. We deal with analysis of road network of existing roads, analyzing the data by means of geographical information system software, assessment of study as well as analysis of the road network, obtaining data of study area. Geographic Information System is the perfect information management as well as analysis tool for lots of aspects of transportation industry that includes both public as well as private sectors [2]. A geographical information system is designed to confine, store, manipulate, manage, and provide the entire types of spatial or else geographical data. Modern technologies make use of digital information, for which a variety of digitized data creation techniques are used. Geographical information systems include components such as Data, Hardware, Software, and Users. University of Rookie Model projected a methodology that comprises of socio-economic factors, Demographic profile as well as spatial distribution of settlements. There is possibility for deciding improved approach in support of computation of force of attraction for different functions. The work is implemented to observe the novel approach for shortest distance computation. University of Rookie Model is employed for Rural Road Network Planning. The changes are suggested in University of Rookie Model for finding out hierarchy of nodes regarding centrality Scores by means of modified approach for computation of weights for different functions.

Fig: An overview of Methodology

III. AN OVERVIEW OF RURAL ROAD NETWORK PLANNING MODELS

In the circumstance of rural road development, lots of research was done on rural road network planning, but some of them were now being functional by several limitations. The effective use of the obtainable resources is made for expansion of rural road network. We deal with analysis of road network of existing roads, road network analysis of new roads, shortest distances among two places and the lengths of roads which are necessary [3]. By studying a variety of techniques by their merits and demerits and moreover their limitations, the variety of models of rural road network planning are briefly categorized into three groups. They are: first model is method which minimizes Travel Resistance, model two is method which minimizes Construction cost and model three is method which minimizes both Travel Resistance Construction cost. The first model minimizes travel resistance which might be moreover travel time or else travel cost. Entirely developed network comes under this category. The network developed on the basis of this criterion needs massive construction cost. The second classification model minimizes construction cost. The network that is developed by this criterion contains least network length, as construction cost directly relies on length of the link. Numerous methods were developed in these groups are Minimal Spanning Tree, System Approach. The entire methods in this group build up minimal spanning tree. The most important difficulty of these methods is that network results in long chains, therefore travel cost is high. Several methods are developed on the basis of population criteria, but villages containing fewer populations are ignored sometimes for provision of connectivity. The third classification model minimizes travel resistance as well as construction cost. The obtainable methods in this group are Multi Criteria Optimal Route Network Planning, University of Rookie Model, and Accessibility approach used in support of Rural Road Network Planning. The benefit of these methods is functional efficacy of link was considered besides construction cost. Some methods are based on gravity concept and some of the methods in third group are functional to build up need oriented linkage pattern on the basis of force of communication among the settlements as well as ink efficiency. In some of methods priority ranking of links for network generation is computed for making of rural road network [4]. This is extremely useful regarding unavailability of funds, where connectivity is provided in various stages as per priority of links. University of Rookie Model is employed for Rural Road Network Planning. This Model projected a methodology that comprises of socio-economic factors, Demographic profile as well as spatial distribution of settlements. University of Roorkee method employed the idea of force of interaction as proxy of travel demand which is applicable to rural roads, as travel demand on rural road is extremely tricky to estimate. The most important criterion in support of rural roads development is to offer connectivity to various

settlements in region in order that fundamental facilities can be available to each habitation. This method can be modified by means of some suggestion in computation force of communication for various functions which is used in support of computation of force of interaction among two habitations. In our study, modification is suggested in University of Roorkee method for computation force of interaction among two habitations for various facilities [5]. The rural road networks were made by approaches of University of Roorkee method as well as recommended modified University of Roorkee method for Study Area. The generated networks were examined for a variety of network parameters and development in most of network parameters is observed by recommended modified University of Roorkee method Approach.

IV. CONCLUSION

We deal with analysis of road network of existing roads, road network analysis of new roads, shortest distances among two places and the lengths of roads which are necessary. Our aim is to find usage of Geographic Information System in transportation field that is finding of fastest route as well as shortest route in road network. University of Rookie Model is employed for Rural Road Network Planning. We have studied three models of rural road network planning such as first model is method which minimizes Travel Resistance, model two is method which minimizes Construction cost and model three is method which minimizes both Travel Resistance Construction cost.

V. REFERENCES

[1]. Alterkawi, (2001) Application of GIS in Transportation planning: The case of Riyade, the Kingdom of Saudi Arabi. http://.www.gis development.net/application/utility/transport.

[2]. Coops, N.C. and Waring, R.H. 2001: The use of multiscale remote sensing imagery to derive regional estimates of forest growth capacity using 3-PGS Remote Sensing of Environment 75, 324–34.

[3]. A. M. Voorhees and Assoc., (1973) ―Short-Range Transit Planning.‖ Prepared for U.S. Dept. of Trans., Office of the Secretary, and UMTA, Washington, D. C.

[4]. Antenucci J., Brown K., Croswell P. Kevany M., with Archer H., (1991) Geographic Information System: A Guide to the Technology.

[5]. Dakan A. W. (1987), The Private Sector and Geographic Information Systems: Papers from the 1987 annual conference of the Urban and Regional Information Systems Association 2: 184-193.

VI. AUTHOR's PROFILE

Shiva Prakash Reddy Swarigari was born on 1995 at medak district, telengana. He is pursuing his bachelor off technologydegree in guru nanak institute of technology ,Jawaharlal nehru technological university Hyderabad.a At present he is final year student in civil department from guru nanak institute of technology,JNTU Hyderabad.

Karthik Mandala was born on 1993 at East Godavari district,Andhra pradesh. He is pursuing his Bachelor of Technology degree in Civil Engineering from Guru Nanak Institute of Technology,Jawaharlal Nehru Technological University Hyderabad .At present he is Final year student in Civil department from Guru Nanak Institute of Technology,JNTU Hyderabad

Sripriya Vadapalli was born on 1995 at hyderabad district, telangana. she is pursuing her Bachelor of Technology degree in Civil Engineering from Guru Nanak Institute of Technology, Jawaharlal Nehru Technological University Hyderabad .At present she is Final year student in Civil department from Guru Nanak Institute of Technology,JNTU Hyderabad

Thaduri Anusha was born on 1995 at hyderabad district, telangana. she is pursuing her Bachelor of Technology degree in Civil Engineering from Guru Nanak Institute of Technology, Jawaharlal Nehru Technological University Hyderabad .At present she is Final year student in Civil department from Guru Nanak Institute of Technology,JNTU Hyderabad.

Madhu Sudhan Reddy.M was born on 1992 at hyderabad district, telengana. He received his bachelor of technology degree in civil engineering from anurag engineering collage,nalgonda in 2013.in 2016 he recived his masters degree in soil meachinics and foundation engineering from vidya vikas inistitute of technology ,chevalla,ranga reddy district .he joined gurunanak inistitute of technology as a faculty where he is a assist

professor with a total experience of 3 years in teachimg field .

Prof. S.Madan Mohan received his Bachelor of Technology degree in Civil Engineering from JNTUCE Hyderabad in 1998. In 2001 he received his Master's Degree in Structural Engineering from University College of Engineering Osmania University, Hyderabad. He joined Gurunanak Institute of Technology as a faculty where he is a Professor and Headof the Civil Engineering Department with a total experience of 17 years in field of Research, Designing and education. He is guiding M.techThesis work in field of Civil/ Structural Engineering. He has papers published in National Conferences and International Journals.