Analyzing Travel Time for Heterogeneous Traffic Condition in Ahmedabad City

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Abstract: Transport condition in Ahmedabad city is rapidly deteriorating because of the increasing travel demand and inadequate transportation system. Due to exponential increase in the vehicle ownership in Ahmedabad results the issue of traffic control and management. The city is facing the problem of traffic congestion and people prefer more private transport than public transport in terms of comfort and convenience leads to the traffic issue. The study area covered for the above problem is New West Zone of Ahmedabad city. The main objective of the study is to develop a travel time prediction model under heterogeneous traffic condition. The study is to be done to access the impact of different travel mode on travel time. For primary data video graphic survey is to be carried out using hand held GPS in the vehicle. Traffic volume survey is performed for primary data. Travel time of different modes to be compared and the effect of vehicle composition on travel time is to be analyzed.

Index Terms - **travel time, heterogeneous traffic, GPS, ANN, regression, vehicle mode.**

I. INTRODUCTION

Traffic in urban areas of India such as Sprat, Vadodara, Ahmedabad, Rajkot is heterogeneous in nature. As the socioeconomic characteristics of the people in the society changes with time and also the development of transportation leads to change in the people's living results into increasing vehicle ownership at faster rate. People prefer more private transport then public transport because private transport provide safety, comfort, and convenience. In urban areas there are restricted chances of expansion of road network because of unavailability of road space. The use of intelligent transportation system is one of the solutions for traffic situation in India.

TRAVEL TIME PREDICTION MODELS
1. Regression Models
2. Artificial Neural Network model
3. Kalian Filtering Algorithm
4. Historical Data Based Model

II. LITERATURE BASE

Travel time is one of the basic parameters for the transport planning, management and operation and this depends upon various factors such as driver's behaviour, traffic and physical characteristics of urban corridors. Traffic characteristics refer to traffic flow and density under heterogeneous conditions, whereas physical characteristics are concerned with road width, geometry, intersection controls.

Jaya Krishna Jammula studies onto develop travel time prediction model for mixed traffic conditions and to determine the effect of mode of transportation on travel time. GPS probe vehicle along with the video camera has been used for different mode of transportation such as 2 wheeler and 3 wheeler has been used as a test vehicles for data collection in the Warangal city of Chennai. Artificial Neural Network model and a multi linear regression model have been developed to compare the estimated travel time with the field data. MATLAB has been used for the comparison of two ANN models.

Krishna Saw, Aathira K. Das are focuses on identification of travel time attributes such as heterogeneous traffic, road side friction and corridor intersection for recurrent traffic condition and to develop an appropriate Corridor travel Time Estimation Model using Multi Linear Regression approach.

III. STUDY AREA

3.1 Study Area location, Ahmedabad

Ahmedabad is the commercial capital of the State and is also known as the textile capital of India. It lies in the cotton belt of Gujarat, 23 km south of Capital Gandhinagar, 552 km north of Mumbai and 96 km from the Gulf of Cambay. It has excellent connectivity through air, road and rail links with Mumbai and Delhi. Historically Ahmedabad has been one of the most important centres of trade and commerce in western India. The city has a great architectural tradition reflected in many exquisite monuments, temples and modern buildings. The city is facing problems of traffic, parking, and pedestrian safety on certain stretches of road in the city.

The study area taken is corridor from Prahladnagar to Sola in the New West Zone of Ahmedabad city as shown in the figure. The study area is selected on the basis of composition of traffic, types of intersection control. It is approximately 8.5 km in length. The selected route should be of great importance both for public and private transport modes.

Figure: 3.1   Study Stretch (Source: Google INC.)

3.2 Demographic Trends

The total population of Ahmedabad is7, 214,225 as per Gujarat census, 2011. The population within the Ahmedabad Municipal Corporation (AMC) area is growing at 2.5% per year and that at Ahmedabad Urban Development Authority (AUDA) area is growing at 3.62% per year. The increase in population within a given area/region results in denser settlements which in turn lead to generation of higher number of trips using various modes.

Table 3.1 Year wise population in Ahmedabad (Source by AMC)

Year	Population	Growth rate	Growth
1990	32,55,000	14.90%	400000
1995	37,90,000	16.80%	535000
2000	44,27,000	18.20%	637000
2005	52,38,000	18.60%	811000
2010	62,10,000	18.20%	972000
2015	73,43,000	6.30%	1133000
2020	84,52,000	8.40%	656000
2025	94,90,000	12.30%	1038000

3.3 Registered motor vehicles

Table: 3.2 Registered Motor Vehicles in Ahmedabad 2009 till 2012 (Source: RTO Ahmedabad)

Vehicle Type	Volume	2009-2010	2010-2011	2011-2012
Two Wheelers	Total	17,28,522	18,75,658	20,22,424
	Growth (%)	-	8.51%	7.82%
Three Wheelers	Total	1,47,136	1,60,852	1,74,173
	Growth (%)	-	9.32%	8.28%
Four Wheelers	Total	3,52,064	3,96,597	4,45,290
	Growth (%)	-	12.65%	12.28%
Buses	Total	23,739	24,142	24,831
	Growth (%)	-	1.70%	2.85%
All Vehicles	Total	23,81,453	26,00,572	28,23,022
	Growth (%)	-	9.20%	8.55%

3.4 Modal Share

In Ahmedabad, the number of trips by walk accounts for 32% of the person trips made daily. Twowheeler has a share of 26% followed by public transport (11%) and car (8%) respectively. It is clearly seen that two-wheelers are the predominant mode of transportation in Ahmedabad. Public transport share is less than walk, cycle and two-wheeler based mode of transportation, whereas the Intermediate Public Transport (IPT) in the form of auto rickshaws has the lowest share among all the modes of transportation in Ahmedabad. The modal share of Ahmedabad has been presented in the Table.

Table-3.3 Mode share in Ahmedabad

Mode share	Share%
Walk	32
Cycle	15
Two Wheeler	26
Public Transport	11
Car	8
Auto	7

3.5 Statistics of Road Network

The greater Ahmedabad Road length 3780 Kms. which maintains National Highways and the all this roads and ways are maintained by the City Municipal Authorities and Urban Development.

Table 3.5 (Total Lane and its Length, Source: AMC)

Road Width		
Lanes	Total Length	% Total Length
1 Lane	2206	62%
1.5 Lane	588	16%
2 Lane	425	11%
2.5 Lane	14	0.25%
3 Lane	48	1.10%
4 Lane	298	7.75%
6 Lane	47	1.10%
8 Lane	35	0.9
Grand Total	3780	100%

IV. METHODOLOGY

1. Basic Identification
It is the very first stage of the project in which details regarding India's population, travel time models, vehicle growth rate, and model share is discussed.

2. Literature Review
Literature review covers basic theoretical support and different types of publications studies which cover the study.

3. Study Area
This stage helps us to know about the details about the selected route and its intersection details.

4. Data Collection
In this stage different surveys carried out like wise Classified Volume Count Survey, Speed Profile Survey.

5. Data Analysis
Data collected from different survey will be analyzed in this stage with help of software like Trans CAD and SPSS-17.O / QUBE.

6. Model Development
To develop a Regression and ANN model for travel time prediction.

7. Conclusion
It covers outcomes, results and concluded points for different chapters and surveys and the development of a model

V. DISCUSSION AND RECOMANDATIONS

Based on the above work we can find the problem in particular zone. The study area covered for the above problem is New West Zone of Ahmedabad city. So as per above study we can give recommendation for develop a travel time prediction model under heterogeneous traffic condition. The study is to be done to access the impact of different travel mode on travel time. For primary data video graphic survey is to be carried out using hand held GPS in the vehicle. Traffic volume survey is performed for primary data. Travel time of different modes to be compared and the effect of vehicle composition on travel time is to be analysed.

Travel time is the most significant factor from both trip makers and transport planners point of view. The traffic composition of 2Ws, 3Ws and CVs matters much in travel time as part of heterogeneous traffic volume, as observed in the present study, apart from the increase in traffic volume. In addition to the heterogeneous traffic characteristics, significant role has been observed by on travel time.

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