

GPS Based Bus Arrival Time Prediction System

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Abstract— There are a lot of researches to this arrival time prediction but only a few have made satisfactory conclusion. This paper presents an efficient way of predicting the bus arrival time at different bus stops along the fixed route. The proposed system takes into account the historical data along with temporal and spatial variations of the traffic conditions and combines it with the real-time data that is received from the global positioning system. A transit network is been made onto which the geographic information of the bus location is tagged in order to calculate the distance. The algorithm is used to find accurate arrival time and demonstrate the error occurring.

The measurement of an accurate bus arrival time is significant for both the traveler and transit services. Travel management is the major concerns in a passenger life, as scheduling the routine plays and the important need. Public Transportation system is not that efficient to provide user the comfort of planning their travel such as the bus services in urban and rural areas. This paper presents an efficient way of calculating the bus arrival time at a particular bus stop by making use of historical data and real-time values along with the other factors.

1. EXISTING SYSTEM

I. INTRODUCTION

As the numbers of vehicles are increasing day by day, which leads to a serious problem of traffic congestion, people are taking public transportation as an alternative. Consequences of congestion lead to low accessibility, loss of travel time and pollution. So far, there is a lot of solution to the traffic congestion, one of them is to improve and expand the use of public transportation system. In urban cities, it is expected that public transportation will become more important for many people. Subsequently, public transportation services should satisfy the customer needs like arrival time and the travel time are the valuable information for both the customer and transport system. Nowadays, by the use of wireless communication, global positioning system and other devices, passengers are able to get information about the arrival time of the transit vehicle. Travel time is the most important information for a traveler and cannot be measured directly. Measuring an accurate travel time is a challenging research problem which is still not achieved as the complexity of variations exists. Some metropolitan areas are providing real time information of the transit vehicle, but still there are difficulties to give accurate real-time information due to the complex nature of urban traffic.

It is even worse in developing countries as considering the traffic is not discipline, collected data is insufficient and the technology is outdated. Thus, for providing real time information, we need to develop an algorithm that can give accurate results. Hence the real time-travel time depends on the behavior of the traffic flow, which in turn depends on other characteristics such as road works, weather, accidents etc. A simple approach is to find average travel time that is derived from the historical data. This approach has a drawback as it does not capture the constant update of the traffic very well.

ibus is an innovative transport system in London which works over the GPS and GPRS. There are 8000 buses across London. ibus is one of the globally recognized and modernized bus tracking solutions in the world. It manages bus transport facilities in an very efficient manner providing accurate details on a daily basis for public transport. Travel comfort levels are highly managed as people traveling from various countries could be guided well through the voice announcement system which gives information about the next stop and various other route directions. This service helps the bus driver to perform in a much reliable and efficient manner and provides safety and confidence to the passengers on broad traveling to various parts of the city. Another efficient way to provide information to passenger is through the electronic information system like the mobile phones or internet. The proposed benefit of the bus service may be many but the mobility of training the blind to travel with confidence on board is the audible announcement systems, the level of trust based the technology encourages the handicapped to live life in a better improved and tech-savvy manner. The driver of the bus has facilities of communicating with the passenger for stopping over various stations. It also provides an announcement system at the bus station which helps in monitoring the time arrival of the bus. Other various announcement recordings are made by the driver.

II. PROPOSED SYSTEM

The proposed Algorithm is divided into two parts for predicting the bus arrival time. In the first part the passenger tries to request for the information about the bus. For example the passenger states requests for the bus number, source, destination of the bus, from this information we can interpret the bus service route and the

direction of the bus. The transit vehicles running on that route are determined by the respective global positioning system (GPS) id. This GPS id has information stored in the database that is unique id, bus number, bus running direction that is either upstream or downstream. The bus running direction attribute is monitored and refreshed every time when the direction changes. After the information that is given by the passenger is matched and a list of buses that come under that route are found. However the position of each and every bus is determined on the geographical map system, only the required positioned buses are noted which must satisfy the request made by the passenger and the remaining should be eliminated. For example It might be the case that there are three buses on the route but only two buses are monitored on the route that are feasible and out of which the nearest bus is located and current speed is measured.

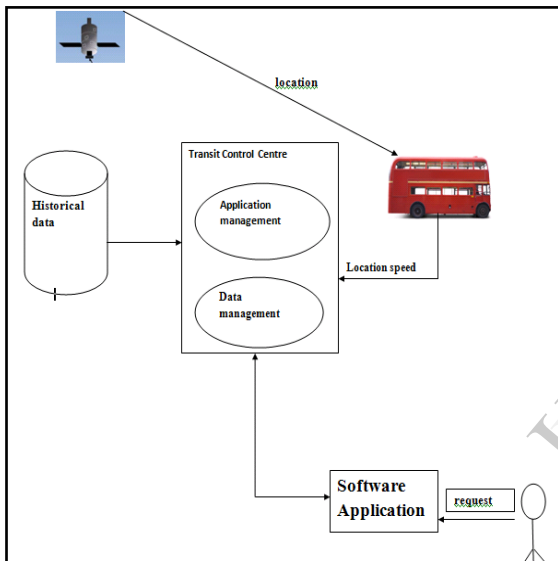


Fig .1 Architecture of prediction model

In order to find the average travel time we make use of the historical data. The historical data consist of the bus speed records that are grouped in time zones and an average of speed is taken out in each of the time zones. The patterns that are recognized in this data help to deeply study the traffic flow operations.

Time Zone (hrs)	Monday Km/h	Tuesday Km/h	Wednesday Km/h	Thursday Km/h	Friday Km/h
8am-10am	35	30	55	51	44
10am-11am	20	21	25	22	23
11am-15pm	18	20	21	24	25
15pm-19pm	21	22	28	20	30
19pm-23pm	48	39	40	45	55

Fig .2 Historical data table for average speed

In the figure 2, records of the average speed have been shown over a period of 5days.

The average speed calculated from the data serves right when the traffic is stable and there is no congestion but lacks when there is variation in the traffic flow. As to overcome this variation and unstable nature of traffic we make use of real time data which is obtained by tracking the bus GPS and gaining the current speed of the bus. The proposed algorithm takes the mean of the current speed of the bus and the average bus speed from the historical data.

$$\text{Speed} = \frac{cs + av}{2}$$

The second phase of the algorithm is to calculate the distance between the bus and the nearest bus stop. After acquiring the GPS bus location that is longitudes and latitudes which is mapped on to the geographical information system then by using the map matching techniques the distance between the bus stations can be measured. The prediction of the bus arrival time can be estimated after calculating the speed of the bus and accurate measurement of the distance between the bus and the bus stations.

III. CONCLUSION

Bus arrival time prediction helps a lot of passengers to save their departure times from homes, workplaces and make any travel plan fast and easy. This prediction system also helps to attract more passengers and increase the demand of buses. The information received by this method can improve the transit agencies management and gain a responsive behavior like real-time scheduling. This system is able to handle and track a large number of buses, identifying there service routes, and the forecasting model predicts the arrival time with great efficiency.

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