

Intelligent Bus Fare Management System using Naive Bayes Algorithm

S.p. Maniraj, Anirudh sharma, Ishika Ratnam, Aman Kumar



Abstract:- In India, Buses are considered to be one of the cheapest mode of Public Transportation. Everyday thousands of people travel by bus to reach their offices, Amusement park, malls etc. The project has it's use in providing an efficient transportation system in India. We are proposing such a system due to increase in traffic in recent days and to promote for public transportation among daily travellers. In this system, we are proposing QR reader for generating bus ticket. Users can scan QR code reader and make payment instead of taking tickets from conductor. Whenever a person decides to travel from one place to another, they have to select from and to location. It will then display all the buses moving in that particular route. The user can then select the bus whichever suits him and then it will display amount details for per person and seat gets booked for the user. Then to generate the actual ticket, the users have to scan the QR code which is placed in the bus and make the required payment. After the successful payment, the conductor and traveller gets notified through SMS. Using this application, the user can also track the location of any bus with the help of GPS (Global Positioning System) and get to know the estimated arrival time(ETA) of a particular bus. The Application reduces passenger waiting time and make their travelling smooth and efficient. Also, we are using Naive bayes algorithm for classification of various attributes such as no of tickets booked every hour, no of person travelling in day, frequency of buses moving etc. Based on these attributes we can predict the probability of Buses required in a particular route, a single person travelling number of times in a day etc and help the public transport companies in increasing the usage while reducing the operational cost.

KEYWORDS: GPS(global positioning system), Naive Bayes Algorithm, QR Code, Fare Collection, Conductor.

I. INTRODUCTION

In India, Buses are considered to be one of the most widely used mode of public transportation. Everyday the daily travelers or frequent travelers undergo a lot of problem due to lack of proper bus management facilities by bus authorities. In most of the cities of India, passengers generally depend on the manual mode of ticket generation and ticket management.

Each bus has a Bus conductor who is responsible for allocating tickets to each and every passenger and collecting the required ticket amount from the passenger. It is difficult for passenger as well as conductor to distribute tickets to everyone during peak hours.

The main disadvantage of this manual method is wastage of papers used in generating tickets on a daily basis. Also, the conductor should keep the required change if needed. It is required that the traveller keep his ticket along with him/her till the end of journey daily. It is also required that the conductor should make sure that everyone has got the ticket and made the necessary payment.

The amount of time and energy taken for generating manual tickets is more than E-ticket. Also, Huge amount of paper and manual labour is needed to print the Tickets on a daily basis. In order to eliminate these difficulties faced by the frequent travelers, a new and improved bus ticketing system using QR Code has been proposed that allows efficient traveling during peak and normal hours. The QR code (abbreviated as Quick Response code) became very popular due to its fast readability and greater storage capacity when it is compared to standard UPC barcodes. Whenever a person decides to travel from one place to another, they have to select from and to location. It will then display all the buses moving in that particular route. The user can then select the bus whichever suits him and then it will display amount details for per person and seat gets booked for the user. Then to generate the actual ticket, the users have to scan the QR code which is placed in the bus and make the required payment. After the successful payment, the conductor and traveller gets notified through SMS. [1] The project has it's use in providing an efficient transportation system in India. To avoid daily traffic problems faced by commuters due to increase in vehicles on roads and to promote the usage of public transport among common people we are proposing such a system.

II. PROBLEM STATEMENT

In the existing system, every bus is handled by a bus conductor. The bus conductor is responsible for collecting money from each passenger and providing necessary ticket accordingly. Initially, printed papers tickets were used as tickets and distributed by conductor to passengers. For example:- If a person wants to travel from one place to another, he needs to wait for the bus at bus stop without knowing when the bus will come and also carry the required amount for buying tickets. After the passenger boards a bus he/she needs to buy a ticket from the conductor present in the bus and pay the required cash to him. This same process is repeated continuously for all the passengers during their journey.



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* Correspondence Author

S.P Maniraj* is currently Assistant professor in Computer Science and engineering in SRMIST,CHENNAI. E-mail: manirajp@srmist.edu.in

Anirudh Sharma, is currently pursuing Bachelors degree program in Computer Science and engineering in SRMIST,CHENNAI. E-mail: anisharma2105@gmail.com.

Ishika Ratnam, is currently pursuing Bachelors degree program in Computer Science and engineering in SRMIST,CHENNAI. E-mail: ishikaratnam@gmail.com.

Aman Kumar, is currently pursuing Bachelors degree program in Computer Science and engineering in SRMIST,CHENNAI. E-mail: aamanraj147@gmail.com.

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This process is time consuming and leads to wastage of human resource as well as energy and manual labour.

1. The traveller should ensure that he has kept his ticket safely till the end of journey.
2. The bus conductor should be aware that everyone has got their respective ticket and no one is left.
3. User needs to make payment in advance before boarding the bus.
4. The Existing model is available mostly for long journeys and not for shorter distances.
5. No proper tracking of buses is available in the existing model.
6. Existing system causes a loss to economy of the country.

III. PROPOSED SYSTEM

With the proposed system, commuters can scan the Quick Response code(QR) instead of buying paper tickets during their travel. The users register in the application by providing their details such as first name, last name, mobile number, email id, and password. After Registration, the users can log into the system using the username and password created. Whenever a person decides to travel from one place to another, they have to select from and to location. It will then display all the buses moving in that particular route. The user can then select the bus whichever suits him and then it will display amount details for per person and seat gets booked for the user. Then to generate the actual ticket, the users have to scan the QR code which is placed in the bus and make the required payment. After the successful payment, the conductor and traveller gets notified through SMS to the number provided during the registration. Using this application, the user can also track the location of any bus with the help of GPS (Global Positioning System) and get to know the estimated arrival time(ETA) of a particular bus.

1. The proposed system leads to the implementation of an efficient ticketing system in the country.
2. It contributes towards a digitalized nation
3. It provides solution with the technologies already present in the smartphones.
4. It reduces the use of paper tickets done through manual ticketing.
5. Proper tracking of buses can be done by using GPS and the estimated time of arrival of bus(ETA) can be displayed in the application.
6. Data regarding available seats, frequency of seats booked etc is updated every hour in the database.
7. It has an easy to use interface.

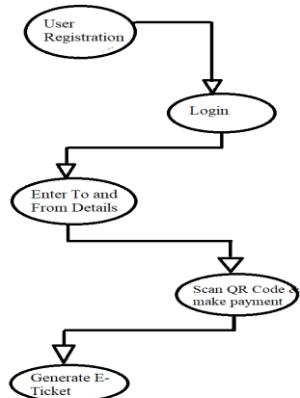


Fig 3.1: System Flow Diagram

IV. RELATED WORK

The main purpose of proposed system is to create awareness among people on the use of new technologies in the transportation sector. Several issues are faced by passengers regarding bus timings, seat availability, ETA etc. Due to this, several travelers are misguided while travelling. Our system helps commuter/travelers in detection of buses moving on a particular route from source to destination and book tickets accordingly whichever suits them. It is very simple, efficient and easy to use technology that can be used by any person facing problems related to bus ticket booking.[2] An Intelligent bus ticket management system will decrease passenger's waiting time. It is also required to deploy an application that is user friendly, cost effective and simple to use. The Quick response(QR) code has become one of the most commonly used types of a two-dimensional code. QR code otherwise called Quick Response code is a two-dimensional standardized identification which was structured in 1994 in Japan. A QR code utilizes four institutionalized encoding modes to store information totally and productively and show it when required. A portion of the basic Applications of QR Code incorporates record the executives, thing ID, general advertising, and item the board and so on. A QR code is comprised of dark squares orchestrated pleasantly in a square network put on a white foundation, which can be perused utilizing a gadget, for example, a camera, and afterward it is handled until the picture can be fittingly comprehended. The essential data. is removed from these examples which are available in both flat and vertical segments of the checked picture and are shown to the client[4]



Fig 4.1:- A QR Code

Generally, A smartphone can be used for scanning QR Codes using smartphone's camera.

Some of the advantages of QR code is listed below:-

1. A QR Code can store typically a large number of information than a simple barcode.
2. QR codes can be scanned from any directions and it is not needed to hold it exactly in front of camera.
3. A QR code reader can be easily downloaded and they are generally free of cost and easy to use

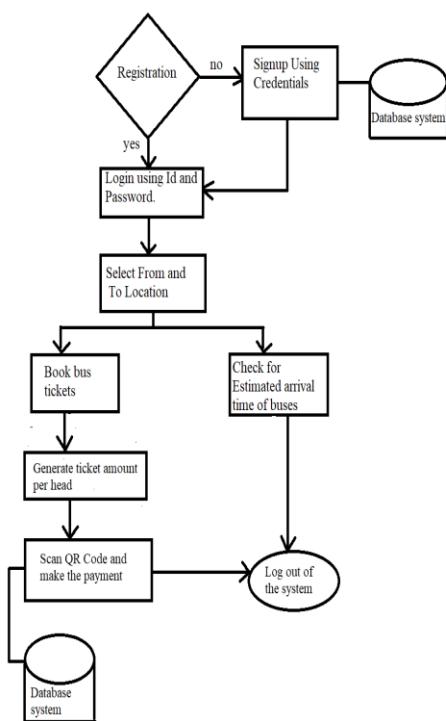


Fig 4.2:- Data flow diagram

Also The tracking of buses can be done using GPS(Global positioning system) Technology and the Estimated time of arrival of buses can be determined. Bus arrival time(BAT) can be determined by adding up all the traveling time and dwelling time at every bus stops btw the traveler and the current location of the moving bus. The dwelling time is known as the delay caused due to decrease in speed of the bus when the bus arrives at the bus stop or leaves the bus stop. The time taken to travel between 1st stop and 2nd stop is represented by t1. The dwelling time between 1st stop & 2nd stop is represented by d1. Similarly, the time taken to travel and dwelling time between 2nd stop & 3rd stop is represented as t2 & d2 respectively. The time of travelling between 3rd stop & 4th stop is denoted by t3.[3]

$$\text{BAT} = t1 - d1 + t2 - d2 + t3.$$

V. DESIGN AND IMPLEMENTATION

Naive Bayes is a probabilistic machine learning algorithm based on the Bayes Theorem, which is used in a large variety of prediction and classification tasks. Various applications of Naive Bayes algorithm include classifying documents, sentiment prediction etc. It is called as “naive” because it is assumed that the features that go inside the model are not dependent on one another, which means that changing value of one of the feature, does not directly or indirectly affect or change any other features used in the proposed algorithm. The Bayes theorem derives the formula for finding the probability of Y when X is given. In real-world problems, there can be have multiple values of X variables. When the features are independent, we can extend the Bayes Rule to find out what is called as Naive Bayes algorithm. Bayes’ Theorem determines the probability of occurring on an event when the probability of another event is given that has already taken place. Bayes’ theorem is represented mathematically using the following equation:

$$P(A|B) = P(B|A) * P(A) / P(B), \text{ where } A \text{ and } B \text{ are events}$$

- P(A) is called the priori probability.
- P(A|B) is the posteriori probability of B.

Here,we are using Naive bayes algorithm for classification of various attributes such as no of tickets booked every hour, no of person travelling in day, frequency of buses moving etc. Based on these attributes we can predict the probability of Buses required in a particular route, a single person travelling number of times in a day etc and help the public transport companies in increasing the usage while reducing the operational cost.

1) USER MANAGEMENT SYSTEM

In this module, a user can register with the basic information like user name, mobile no, e-mail id, password etc . In this section user can login with user name and password and book bus tickets whenever they require. The user can also manage his/her profile using this module

2) DATABASE MANAGEMENT SYSTEM

In this module, all the user details are stored along with the details of the ticket such as date of travelling, ticket cost, Source address, destination address etc booked by a particular user during his\her journey.

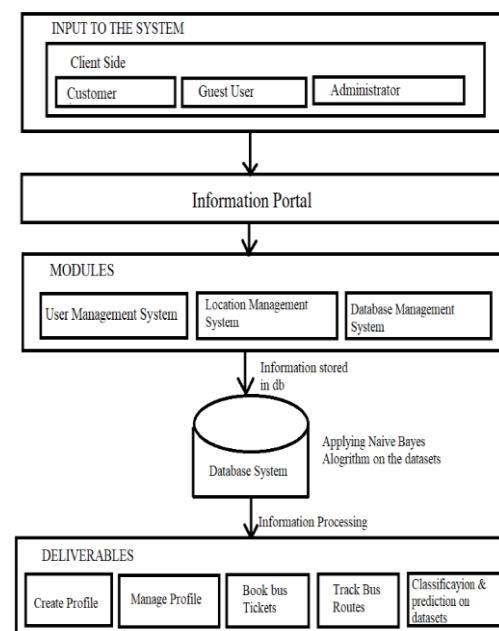


Fig 5.2:- Architecture Diagram of Intelligent bus fare Management System.

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3) LOCATION MANAGEMENT SYSTEM

Whenever a person decides to travel from one place to another, they have to select from and to location. It will then display all the buses moving in that particular route. The user can then select the bus whichever suits him and then it will display amount details for per person and seat gets booked for the user. Then to generate the actual ticket, the users have to scan the QR code which is placed in the bus and make the required payment. After the successful payment, the conductor and traveller gets notified through SMS to the number provided during the registration. The user can also track the buses and get to know the estimated time of arrival of a particular bus.



S.P. Maniraj, Assistant professor (senior grade), Department of Computer Science and Engineering, SRM Institute of Science and Technology, Chennai.



Anirudh Sharma, B. Tech Computer Science and Engineering, SRM Institute of Science and Technology, Chennai.



Ishika Ratnam, B. Tech Computer Science and Engineering, SRM Institute of Science and Technology, Chennai.



Aman Kumar, B. Tech Computer Science and Engineering, SRM Institute of Science and Technology, Chennai.

VI. RESULT

This application performs with an ideal degree of 85% by expanding the proficiency all the while. Right now per user was utilized and we make one application for choosing the voyaging course and producing sum. After age of the sum the client needs to peruse the QR picture at that point consequently it will send the sum from the wallet or utilizing the bank subtleties

VII. DISCUSSION

The essential thought behind this framework is to make a more productive and mechanized framework to give tickets. It focuses on limiting client exertion and making a basic and precise mode if giving tickets. The QR code is a proficient innovation which can be utilized to make a framework robotized. Likewise it makes straightforwardness among the client as should be obvious the whole procedure. .

VIII. CONCLUSION

Our paper highlights the various issues faced in bus fare ticket management system. Our research paper is basically focusing on these problems and proposing beneficial solutions for it. The paper focuses on how to secure passenger information and book tickets online while reducing manual ticket booking. To eliminate the drawbacks of manual ticketing system we are proposing a Quick Response (QR)Code based ticket booking and payment. The proposed system also provides a way for tracking the route of buses.

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