International Journal of Applied Engineering Research ISSN 0973-4562 Volume 13, Number 12 (2018) pp. 10604-10606

Passenger Flow Analysis in Metro Network Using Machine Learning Technique

Raparthi abhinay[1], Thanishya yella[2], Devakunchari R[3]

[1,2,3,]*Department of computer science and engineering, SRMIST, Kattankulathur,Chennai, Tamilnadu,603203, India.*

Abstract

Today the prediction for seat availability and controlling the flow of passenger in the local trains is a challenging task. The passengers are not aware of time and seat availability which leads them to the waiting list. Also, most of the passengers try to book at the same time and its makes the server to slow down its process. In this paper, the prediction system for ticket availability and calculation of travel time is accomplished. The proposed model is tested with the collection of the several years of data set from the southern railways. The data set possess the details like train number, train name, total passengers, total number of seat, date and time. The proposed prediction system reduces customers effort for easy booking of the train.

Keywords: Naivebayes, seat prediction, metro network, ticket availability

INTRODUCTİON

The Indian Railways (IR) conveys around 5.5 lakh travelers in held settlement consistently. The electronic Passenger Reservation System (PRS) encourages booking and wiping out of tickets from any of the 4000 terminals (i.e PRS booking windows) everywhere throughout the nation [1]. These tickets can be reserved or scratched off for ventures initiating in any piece of India and consummation in some other part, with movement times as long as 72 hours and separations up to a few thousand kilometers. Numerous individuals could not book beforehand in light of the fact that they do not know when ticket will be accessible. So it is been discovered that the arrangement is to give productive forecast framework to check ticket accessibility. This paer involves developing keen prepare look application for effective hunt utilizing machine learning techniques.

RELATED WORK

A review of the foundation, ideas, essential techniques, real issues, and current uses of Parallel transportation Management Systems (PtMS) is proposed by F.-Y. Wang et al [1]. Generally, parallel control and administration is an information driven approach for displaying, investigation, and basic leadership that considers both designing and social many-sided quality in its procedures. The advancements and applications depicted here plainly show that PtMS is successful for use in arranged complex rush hour gridlock frameworks and is firmly identified with rising innovations in distributed computing, social registering, and cyberphysical-social frameworks. An RFID electronic tag based automatic vehicle identification system for traffic IoT (Internet of Things) applications is proposed by M. Yu, Wang et al [2]. The outline and usage of a dynamic RFID label based framework for naturally distinguishing running vehicles on streets and gathering their information was defined. The framework will have wide applications in rush hour gridlock IoT to help activity checking, movement stream insights, activity planning, and unique vehicle following. The Intelligent Transport System (ITS) is proposed by X. Cheng et al. [3] and charge is imagined to be a critical part of the anticipated keen matrix. A shrewd lattice vision of the electric vehicles for the following 30 years and past is introduced from six points of view related to keen transportation frameworks: 1) vehicles; 2) foundation; 3) voyagers; 4) frameworks, tasks, and situations; 5) correspondences; and 6) social, financial, and political. Comparison of modeling approaches is proposed by B. L. Smith and M. J. Demetsky et al [4]. The ability to figure the movement volume in an operational setting has been recognized as a basic requirement for smart transportation frameworks. Application of seasonal autoregressive integrated moving average and exponential smoothing models is proposed by B. M. Williams, P. K. Durvasula, and D. E. Brown et al [5] which tend to the use of occasional time arrangement models to the single-interim movement stream anticipating issue for urban roads. Regular time arrangement approaches have not been utilized as a part of past anticipating research.

PREDİCTİON MODEL FOR METRO-SEAT AVAİLABİLİTY

Challenges

In Indian railways, so far the ticketing system is done in two ways. First, the individual himself goes to the counter and book the ticket i.e., reservation ticket. The second is passengers book rail tickets online. Passengers also book tickets through the agents approved by Indian railways. People don’t like to stand in queues because in every important junctions and platforms due to arrival of subsequent trains there may be a lot of crowd. Due to this reason, people are afraid to compete and board the train in the crowd and hence will lose the train. So, some people travel without ticket. This has become the most serious issue for our country’s development. The paper focused to leaverage GPS tracing and scheduling. So, passengers can check the traveling time. Passenger can view the number of available seats in train. The system enhance the privacy and security of train management system.

Proposed model

The fig.1 represents the proposed architecture containing the checking of train seat availability process. The old train reserved records are stored in the respective database by Admin. The proposed model consists of following modules,

A. Data collection

The past year train records are collected from the southern Indian railways [6] and also some are simulated from the existing records. The dataset contains passengers name, train number, date and time, total number of seat in train. The dataset will be stored in database by the admin.

B. Analysis

The existing data set from the database is selected. The train details and total number of passengers traveled in individual trains are extracted and analyzed result are stored temporarily in database.

C. Linear and probability equation

The data set is trained using Bayesian machine learning techniques for analysis. Bayesian technique is achieved using the linear probability equation. Select the values randomly from analyzed result using the linear equation and probability. Selected values are send to the prediction module

Naive bayes probability equation is given by,

$$P(h|d) = (P(d|h) * P(h)) / P(d) \quad (1)$$

Where P(h|d) is the probability of the hypothesis H given to that of the data d. So this is called the Posterior probability. P(d|h) is the probability of the data d given to that the of the hypothesis when h was true. P(h) is the probability of the hypothesis h was being true. This is called the prior probability of the given h. P(d) is the probability of the data provided.

The accuracy [7] in eq. (2) is calculated using the performance measures of accuracy in machine learning such as tp, tn, fp, fn which denotes true positives, true negatives, false positives and false negatives respectively.

$$Accuracy = ((tp+tn)/(tp+fp+fn+tn)) \quad (2)$$

D. Future prediction

The future data set is predicted by entering the passenger source and destination value in the search box. Random values are selected from the input and compared with the existing dataset. Linear equation and probability equation is used for taking random values from the existing database. The future availability of seats is then predicted for particular train. The prediction result set contain train name, train number, traveling time, availability seat.

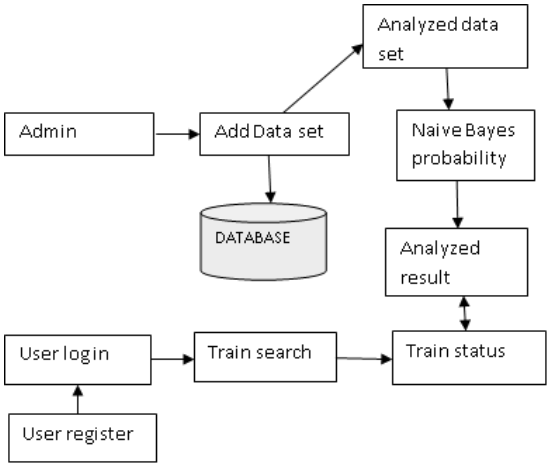

Figure 1. Proposed model

The below fig. 2 depicts the activity performed in different modules.

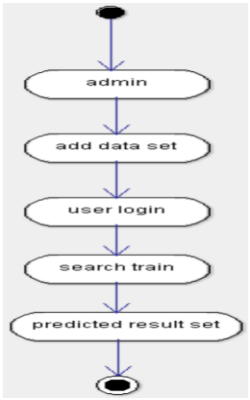

Figure 2. Activity diagram

RESULTS AND DİSCUSSİON

The below fig.3 and fig.4 represents the classification accuracy and prediction error showing the number of false positives and true negitives.

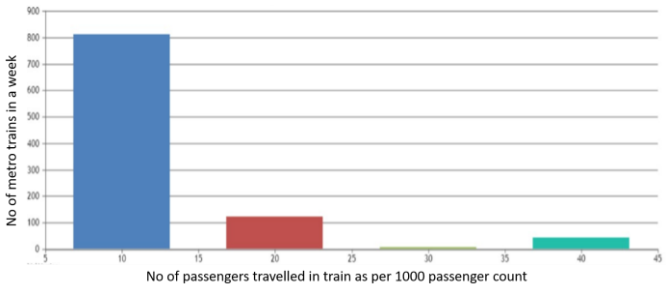

Figure 3. Accuracy

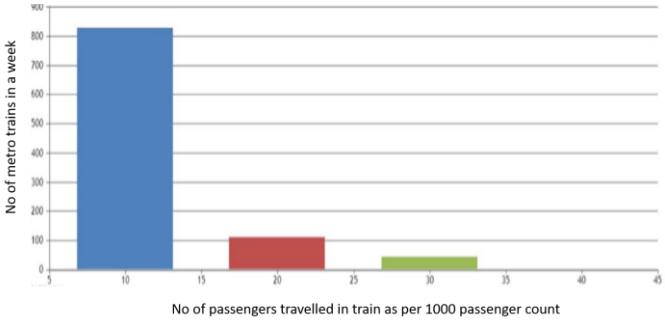

Figure 4. Prediction error

The below fig. 5 depicts the passengers traveling in train during rush hours and percentage of trains before announcing in minutes of departure with no of passengers passed.

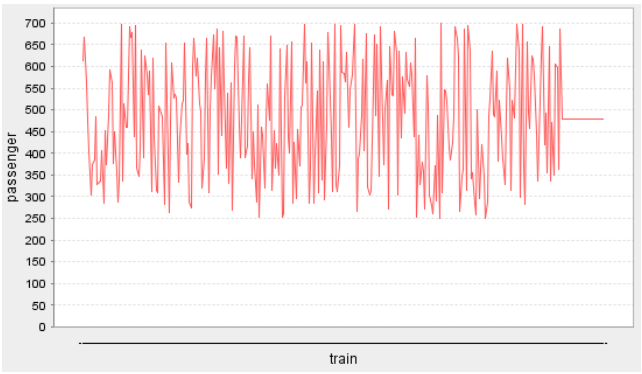

Figure 5. No of passengers vs trains in rush hours

CONCLUSİON AND FUTURE SCOPE

The existing system focus only on the train prediction system. The paper proposes efficient train prediction system which allow passengers to easily search available train with the available tickets. It helps the passenger to get alert for ticket booking in future, so it will be useful for the every passengers. Privacy and security is not concerned in the proposed work. In future, the work will be implemented with privacy and security using various algorithm like AES, RSA, ABE, IBE, base 64.

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