

An Interactive Airport Management System using Predictive Analysis

¹Dr.S.Ramamoorthy, ²Pramit Ranjan Kole, ³Rohit Kumar Srivastava

ABSTRACT— Airport Traffic Management is a very important and necessary operation for any Airport authorities maintaining the airports across the Globe. There is proper analysis model require to predict the amount of passengers planning to visit the airport during the specific time period. The After this analysis, based on the predictions, the airports authorities can do queue management at the boarding pass counters and then an Android app can be used for emergency boarding pass generation of passengers which will allow them to board flights successfully. This will avoid the last time rushes and long waiting time on the queue for the passenger want fly through particular airport. Many survey papers have been published regarding the Airline Traffic Management but there is no sufficient evidence that proves the required amount of arrangements and alternate options to maintain the airport crowd in a fair way. The Proposed work focus on performing Big Data Analytics over Airline traffic datasets collected over the period of time. The given datasets are classified using Modified Timeseries and Decision making algorithm. From the data analysis results the suggestions can be given to specific airports about the number of people coming to the particular airport at a particular dateThe entire model is implemented using python and the results are outperforming the existing results. From the performance analysis it shows that the current model provides the better prediction this will help the Airport Authorities to improve their service.

Keywords--Airport, Data Analysis, Classification, Decision Tree Algorithm, Prediction etc.,

I. INTRODUCTION

The Airbus usage ratio among the passengers got improved in the recent years. When an airport combines its information systems, all people, whether passengers or the airport staff gets advantage of this. Automated exchange of real-time data and information among the present and existing systems leads to more efficient airport operations. It fastens up the flow of people, cabin baggage and cargo luggage of aircraft inside the airport.

With United and combined systems, they give better resources and hence it leads to more productively and improved on-time performance. Nowadays, airport authorities are plagued with ever increasing passenger growth. The various activities like Less waiting times, regular access to up-to-date information are makes an airport attractive among the passengers. Any Airport which ensure that passenger demands are met. The proposed work also aims to contribute substantially to meeting these prerequisites.

¹ Dept. of Computer Science and Engineering, SRM Institute of Science and Technology Chennai, Indiaramamoorthy.s@ktr.srmuniv.ac.in

² Dept. of Computer Science and Engineering, SRM Institute of Science and Technology Chennai, Indiapramitranjan_rr@srmuniv.edu.in

³ Dept. of Computer Science and Engineering, SRM Institute of Science and Technology Chennai, India rohitkumar_rk@srmuniv.edu.in

1.1 EXISTING SYSTEM

The existing system focuses more on how to maximize the flight revenue by utilizing the available airline's resources. The predictive model for the requirement analysis over the historical data given less preference. The travel behavior research is to describe various travel behavior of the passenger would be considered for evaluating the behavioral assumptions underlying the different models.

A resource locking mechanism must be considered as a major component in any analysis model that define the resource utilized by one user at a particular time are not manipulated by a different user. The model for estimation of the profitability of an additional flight after being imposed the congestion charge on.

The paper perform mining the previous airfare data and developing data modeling technique to predict the price variation over time so that the passengers would get the benefit for comparison. The model assists the airlines to provide commendable services to the passengers.

This paper focuses on the guidelines regarding the communication between airport staff and passengers. This paper deals with the aspects of airport service quality evaluation. This research paper deals with the study of United States aviation industry. This research paper presents a fuzzy technique for dealing with a complex set of quality variables.

The Existing System would not be able to improvise in situations of large traffic at the airports. In the present system, only a limited number of boarding counters, Security check counters allocated to a particular Airline. There is no flexibility in the existing system.

This process makes the passenger uncomfortable during the airport visit. There should be preplanned boarding counters and other services required to arrange in advance to make the process simple.

1.2 PURPOSE OF THE RESEARCH WORK

- The main purpose of the research work is to minimize the number of people who miss their flights and also to help airport authorities to manage the crowd during the peak time.
- The main reason of late comers missing their flights is the long queues at the Boarding Pass and Security Check areas.
- Enhances the passenger processing and reduces the passengers' waiting time for Boarding Pass generation and Security Check will ensure the peaceful travel and attract more passengers towards the airport.
- This would greatly assist passengers, especially late passengers to catch their flights.
- Eventually, airports will be able to manage the rush and will also be able to ensure that the number of passengers missing their flights is minimized.

II. OBJECTIVE OF THE RESEARCH WORK

The main objective of the proposed work to ensure the peaceful and less complicated service for the passengers traveling through particular Airport. The proposed data analysis model enable the Airport authorities can able to predict the exact number of visitors and pre arrangements required to maintain the crowd. Proposed model define the various parameters required for this analysis.

- The Proposed model will analyze the past airport passenger count data of the past 13-20 years.
 - After this analysis, the predictions on future passenger count for future years will be predicted using algorithms such as time-series and decision trees.
 - Based on the predictions, the airports will be able to handle the rush smoothly as they would already be aware of the approximate number of passengers which will be there at a particular future time. (say next month).

III. PROPOSED SYSTEM

Architecture diagram

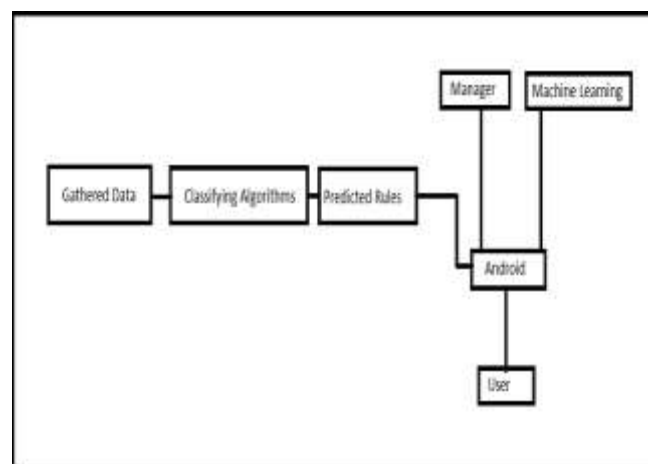


Figure.3.1 Proposed Architecture Diagram

The proposed work collect the Air Passenger respective Airport visited details dataset for the analysis process. The collected dataset included for the classification of based on the Timeseries and decision Tree algorithm to derive the outcomes. The machine learning based processing is performed over the input data to derive the set of conditions to accommodate the passenger by the airport management.

The Android application is deployed to the counter based on the outcome of the analysis to ensure the airport services without any interruption. This predictive model outcomes helps the

The proposed model processes the big data under the Hadoop framework by storing the datasets in the Hbase and Hive. The huge volume of dataset generated by the airports across the globe processed using map-reduce algorithm under the Hadoop environment. The figure 3.2 shows that the various components involved in the data analysis and classification process.

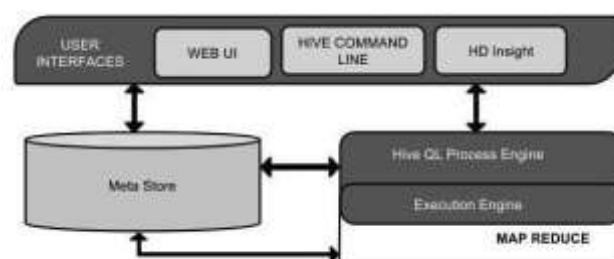


Figure3.2 Hadoop based data analysis model

All the components are built above HDFS and all operations are carried out in HDFS.

The proposed work captures the real-time airport passenger details and service provider data to make the prediction model.

The dataset which has been used has the following parameters. The parameters used are Activity Period (Year and Month), Operating Airline, Passenger Count, etc. It mainly describes the trend of passenger count according to the months and years.

3.1 Algorithms Used

The algorithms mainly used time-series and Decision trees for the classification and data prediction model.

A. Time-Series

A time series model can predict trends based only on the original datasets that are used to create the model. We will use the time-series algorithm in our project for the monthly prediction of the rush at the airport. Based on the historical data of the previous and the current months, we can predict the rush at the airport in future months.

B. Decision-Tree

In decision trees, for predicting a class label for a record we start from the root of the tree. In our Project, Decision trees will be used to predict whether a passenger is “late and eligible for Priority Boarding” or not based on a parameter ‘Remaining Time’. Remaining Time is the time left for the departure of the passenger’s flight.

IV. IMPLEMENTATION

The Proposed work Datasets will be processed by using Big Data tools such as Hive and Pig. The time-series and Decision tree Algorithms applied over the airport datasets to predict the passenger behavior under the specified duration.

These algorithms are implemented using Pandas library of Python. The results of the algorithms will be used to predict the number of people who will arrive at the airport at a particular time in the future.

In times of Customer Urgency at airports, the Android App will be used to classify passengers who have the highest chances of missing their flights. Those particular passengers will be allowed to board their respective flights and no passenger would lose their flight. The sample datasets are provided in the Table 4.1, which shows the details of the Airline operations and passenger details.

Table 4.1 Airline Operations and Passenger Details

Activity Period	Operating Airline	Operating Airline IATA Code	Publish ed Airline	Terminal	Boarding Area	Passenger Count
201809	Air New Zealand	NZ	Air New Zealand	International 1	G	9096
201809	United Airlines	UA	United Airlines	International 1	G	51264
201809	United Airlines	UA	United Airlines	Terminal 3	E	10438
201809	China East	MU	China Eastern	International 1	A	10180
201809	Volaris Airlines	Y4	Volaris Airlines	International 1	A	2086
201809	Air India Limited	AI	Air India Limited	International 1	G	7250
201809	Frontier Airlines	F9	Frontier Airlines	Terminal 1	B	13048
201809	Korean Air Lines	KE	Korean Air Lines	International 1	A	13493

Table 4.2 Period Vs Passenger Visiting Frequency

Month	#Passengers	Travel Frequency
2005-07	28050.16522	High
2005-08	27083.61017	High
2005-09	23029.85714	Avg
2005-10	23480.63559	Avg
2005-11	23162.23894	Avg
2005-12	23855.33036	Avg
2006-01	21294.68696	Low
2006-02	20583.55556	Low
2006-03	24625.25455	Avg
2006-04	25211.75455	High
2006-05	25718.18182	High
2006-06	26942.07018	High
2005-08	27083.61017	High
2005-09	23029.85714	Avg
2005-10	23480.63559	Avg
2005-11	23162.23894	Avg
2005-12	23855.33036	Avg

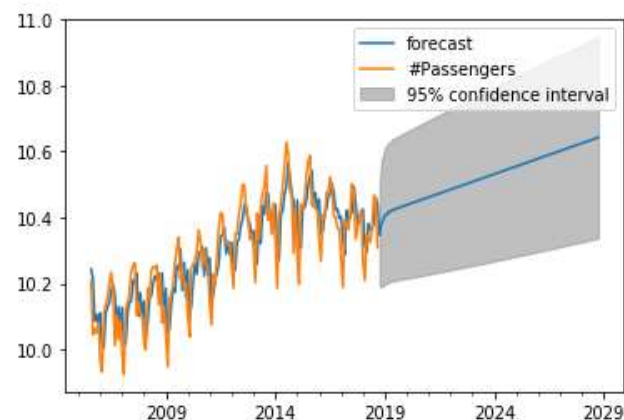


Figure 4.1 Passenger Arrival Vs Confidence Rate

The Figure1 shows that the proposed analysis model effectively predicts rate at which expected passenger arrival and the kind of arrangement required in-terms of confidence interval.

4.1 BENEFITS OF PROPOSED SYSTEM

- Faster processing of the data entries of the airport database of passengers.
- According to the Big data analysis, the results of the analysis can be used to predict the number of people coming at a particular date at the airport.
- This would enable the airport authorities to be prepared beforehand

V. TRADE-OFF BETWEEN PROPOSED SYSTEM AND EXISTING SYSTEM

The Existing System would not be able to improvise in situations of large traffic at the airports. In the present system, only a certain number of Boarding counters, Security check counters are allocated to a particular Airline. There is no flexibility in the existing system.

At times of large traffic at the airports, many flights will get delayed. Many people would lose their flights leading to customer inconvenience. The Proposed System will use Big Data tools like Hive and Pig.

The Proposed System will analyze the number of people coming to the airport at a specific time. In the Proposed System, the passenger processes will be completed in a very short time.

VI. CONCLUSION

The proposed work perform the data analysis over the airport passenger visit details and apply the machine learning based classification algorithm for predicting the future frequency. Based on the predicted values the Airport Authorities are able to initiate the pre arrangement required on the service counters to make the passenger comfortable. The proposed model outcomes provide the better results compare to the existing prediction models.

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REFERENCES

1. Airport Information Systems— Airside Management Information Systems by Adam Marks, Kees Rietsema, Published in Scientific Research Publishing Inc. 2014.
2. Analysis of Airport Operations- N.Sumathi, Parthasarathi A, Published in International Journal of Latest Technology in Engineering, Management & Applied Science (IJLTEMAS) Volume VII, Issue III, March 2018.
3. A method to evaluate the time of waiting for a late passenger- by Jacek Skorupski, Magdalena Wierzbinska, Published in ELSEVIER Journal, 2015

4. Passenger Flow Forecasting Research for Airport Terminal Based on SARIMA Time Series Model by Ziyu Li, a Jun Bi,b and Zhiyin Li, Published in 1st International Global on Renewable Energy and Development (IGRED) ,2017.
5. Building Proper Forecast Model for Daily Air Passenger Demand: A Study of Antalya International Airport, by Murat Cuhadar, Published in Conference Proceedings of National Atlanta Hospitality Tourism and Travel Research, 2014.
6. Model for Forecasting Passenger of Airport by Farzane Ahmadzade et.al., Published in Proceedings of the 2010 International Conference on Industrial Engineering and Operations Management, 2010.
7. Predicting Airline Passenger Load: A Case Study, by Ma Nang Laik ,Murphy Choy , Prabir Sen et.al., Published in IEEE Conference on Business Informatics, 2014.
8. Predicting Taxi-Out Time at Congested Airports with Optimization-Based Support Vector Regression Methods, by Guan Lian, Yaping Zhang, Jitamitra Desai et.al., Published in Mathematical Problems in Engineering, 2018.