

Data analytics to allocate berths in reserved compartments in Indian railways

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Abstract

Indian Railways is one of the biggest nationalized organization in India. Started in the year 1832 for goods carriage and 1853 for passengers [1]. Indian Railways is 4th biggest railway zone amongst all in the world after USA, China and Russia. Indian railways operating their services in India by providing their services by laying the track of 67,368 KM's. And the services are improvised day by day like from Narrow Gauge to Broad Gauge, Single Track to Double and Triple Tracks, Electrification of lines etc., though the Indian Railways are improving day by day the facilities in different sectors, still there are some areas where the traditional ways are followed by Indian Railways likely while booking tickets in reserved compartments, Railway Gates etc [1], In this research paper, the main aim is to develop an analytical system to allocate berths in the reserved coaches based on the architecture and facilities available in the coaches. Existing way of allocating berths in the reserved coaches is not sufficient to serve the needy, though they reserved their seats on their own. In this paper the new way of allocating berths is been defined to serve the needy by using Big Data Analytics. The analytics are performed in both Normal Reservation Coaches and Air-Conditioned coaches and improves the profit by increasing the number of passengers traveling in Indian railways every year.

Keywords: Indian Railways Reserved Coaches; Big Data Analytics; Passengers; Allocating Berths.

1. Introduction

Indian Railways is the largest public sector in India with 1.308 million employees [2] working at various levels. Indian Railway not only connecting the major Cities or Towns it is also covers the villages as well. In addition, the cost and comfort of journey is the success of Indian Railways. The different type of reserved coaches and facilities offered by Indian Railways is shown in the below images.



Fig. 1.:Railway Coach.



Fig. 2: Sleeper Coach without A/C.



Fig. 3: Side Berths.



Fig. 4: 3 Tier A/C.



Fig. 5: First A/C.



Fig. 6: Two Tier A/C.

Fig. (1) represents the overall view of the coach. The Color and dimensions of the coach varies based on the type of the train like Rajdhani, Humsafar and Garibrath etc. The fig (2) represents how the interior view of reserved coaches without Air Conditioning which is popularly known as sleeper class. The fig (3) represents how the side berths are organized for the passengers. And the Fig (4) represents how the reserved coach of Air-Conditioned looks like especially when it comes to Three- Tier and fig (5) represents the Two Tire A/C [3]. In the all above figures though they are sophisticated in nature. the main problem arises in allocating berths. Let us assume there is an old person of 70 plus years is reserving the ticket to travel from source to destination they do not have the option of choosing lower berths. Once they allocated with some berth either middle/upper/side upper the passenger or old person should reach the station enter train then request co passengers to adjust themselves as the old passenger could not able to climb to either to middle/upper or side upper. This is the problem which Is happening every day in most of the trains [4]. Why this problem is happening because the analytics are not properly applied while allocating berths to passengers. most of the

times the berths are allocated based on priority than the need. In this proposed system, the analytics are applied such a way that initially the passenger gets ticket confirmation and at the time of chart preparation the message will be delivered to passengers which berth is allocated based on some criteria.

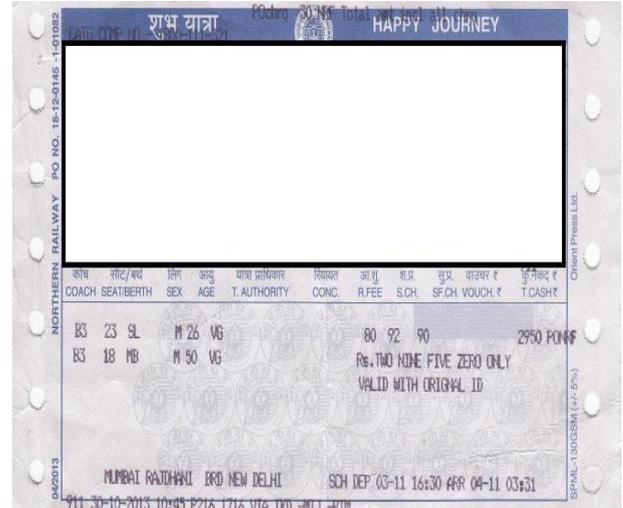


Fig. 7: Problem with Existing System.

This research paper is not to find the faults of the existing system it mainly focuses on the advancement of the existing system to satisfy the needs of the passengers.

2. Existing system

In Existing system as discussed most of the time the reservation will be done based on the priority. Though the berths are allocated immediately to the passengers 80% of the times the passengers are not satisfied as they might have not got the berths as per their need. In the Below image it shows a 26 years male got Side Lower Berth whereas 50 Years male got Middle Berth as shown in fig (7) [2].

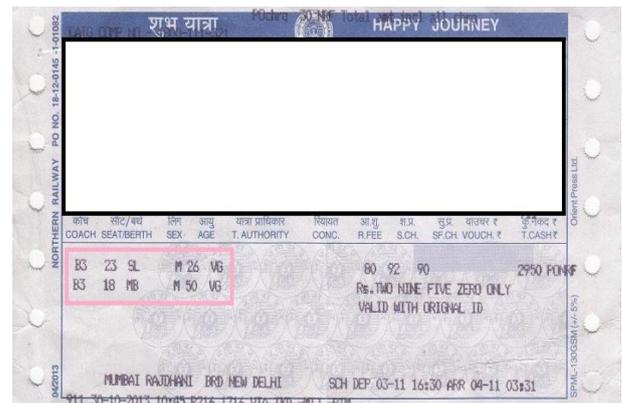


Fig. 8: Berth Allocation on Priority Basis.

You just imagine there will be more than 9000+ trains are traveling every day out of which approximately 4000+ [5] trains are having reserved coaches, just assume if in each train the 2 or 3 passengers per coach is facing this kind of problem. Then how to solve this problem, is this problem is associated with man power? No, because TC also cannot adjust that many berths as the passengers count is increasing day by day. Then what is the solution.

3. Proposed system

The proposed system is one of the best way to allocate berths without changing the architecture or design of the coaches. The entire system will works based on analytics. The Main parameter

considered here is age, Health Condition and the Ticket Collector must check at the time of verification these two details to avoid fraudulent transactions [5].

4. How it works

4.1. Algorithm -1: partial reservation algorithm

- 1) Passenger will Login into the reservation system.
- 2) Passenger will choose all the details like from/To/Train/Class (Sleeper/AC etc.,)
- 3) The system will calculate number of berths available based on the selection made by the passenger.
- 4) If, vacant berths are available it will inform it to passenger to complete the process.
- 5) Then passenger will complete the entire procedure of payment etc., to confirm his reservation.
- 6) The system will confirm the reservation and sends PNR number to passenger.
- 7) Now only the seat is reserved for the passenger the berth is not at allocated.

After the above algorithm executes for multiple number of times to fill the vacant berths, on the day of journey before 4 hours the passenger comes to know about his Coach and Berth Number Details.

The provision of Cancelling the tickets and Auto Upgradation remains same. And for the Passengers who reserves their ticket under Tatkal Scheme the confirmation will be given immediately as shown in above procedure, but the Coach and Berth details will be sent through message next day before 4 hours of the journey [5].

4.2. Algorithm to allocate coach/berth

The Berths will be allocated majorly based on two criteria's, one is based on age and other major criteria is based on health condition.

- 1) Freeze the reservation process for a while.
- 2) Do not allow any passenger to do reservation process at least for 5mins.
- 3) Perform the analytics and allocate the berths.

4.3. Analytics algorithm

- 1) Give first preference based on the age and allocate them lower births.
- 2) The min age should be more than 50 years.
- 3) Second preference will be given for the Physically Handicap and unhealthy people and allocate them lower births.
- 4) Next, allocate lower berths for the Mother's with Infants.
- 5) Once it is done then prioritize the berth allocation based on the age factor.

Now what will happen most of the Senior Passenger, Physically Handicap [4] and Un healthy passengers and Mother's with Infants surely will get lower berths [6]. Though this system does not solve 100 percent problem at least 90-95% problem will be solved. And, the TC is given right [6] to change the berth of the passenger based on the need of the passenger and genuinely of the scenario. So, this proposed system will solve at least 95% of the problems in allocating the berths to the passengers.

Table 1: Passenger Information after Applying Analytics

S. No	Name	Age	Physically Challenged	From	To	Train Number	Allocated Birth
1.	M S Satya Narayana	32	No	Bangalore	Chennai	12786	S4-Upper-14
2.	V K Shankar Rao	68	No	Bangalore	Chennai	12786	S4-Lower -12
3.	Rama Rao	48	NO	Bangalore	Chennai	12786	S4- Middle -13
4.	Rajesh NR	21	Yes	Bangalore	Chennai	12786	S1-Lower - 12

5. Conclusion

The proposed system will solve 95% of the problem which passengers are facing now with respect reserving the berths. And, the number of passengers will increase intern the profit of Indian railways will increase. The Only additional functionality increased compare to existing is TC must check the proof of age and disabilities certificate along with ticket checking.

The analytics can be further improved to issue tickets in special trains as well.

6. Future enhancement

The future enhancement for this application is extending these analytics to all varieties of trains, which includes Shatabdi, Rajdhani, Humsafar etc.

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