

Online Vehicle Booking Market In **India**

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Sr No.	Team Members	Github Link
1	Shreyas Gonjari	https://github.com/Shreyas2831/Online-Cab-Booking-System
2	Dhanush Thokala	https://github.com/danushtokala/Project-2-Feynn-labs/blob/main/Project%202.ipynb
3	Harsh Yadav	https://github.com/Shreyas2831/Online-Cab-Booking-System

Table of Contents

1. Introduction
2. Problem Statement
3. Data Collection
 - 3.1 Data pre-processing
4. Segment Extraction
5. Selection of Target Segment
6. Customizing the Market Mix
7. Market Segmentation
8. Fermi Estimation
9. Insight and Recommendation

References

1. Introduction:-

There are three phases to this vehicle booking system.

- 1) The first phase entails organising car rental locations into pools and allowing pooled car rental outlets to share a fleet of automobiles.
- 2) The second phase for each pool determines the types and quantities of cars to be acquired and delivered to the auto manufacturer, as well as the geographic redistribution of automobiles among pools across the long-term planning horizon.
- 3) The third phase entails day-to-day operations, during which the fleet's deployment within each pool and among its locations is determined.

A. Need for Vehicle Booking System

Nowadays, there is Online Car Rental, which benefits users greatly. A rental service is one where customers come to seek the rental of a rental unit. It is more convenient than paying for the unit's ownership and maintenance. A car rental company lends autos for a price for a few hours, a few days, or a week or more.

B. Objective of Vehicle Booking System

The project's goal is to automate vehicle rental and reservation so that clients don't have to waste time calling and waiting for a vehicle. To convert the manual car rental procedure into a digital method. A customer satisfaction test was used to validate the rental automobile system. As a system development reference, create documents such as Software Requirement Specification (SRS) and Software Design Description.

2. Problem Statement:-

A vehicle booking is a vehicle that may be booked for a price and utilised for a specific distance to travel. Getting a booking automobile makes it easier for people to travel around when they don't have access to their own vehicle or don't own one at all. A person who needs transportation must book a cab car company and simply book it. This method improves client retention while also making car and employee management more straightforward.

3. Data Collection

- i. For the collection of the dataset our team had worked combinedly for the data collection and the important features which should be included in the data.
- ii. We have done a lot of research by visiting various websites, reading blogs and data extraction.
- iii. According to the problem statement of Online Vehicle booking, we have considered some Geographic segments like location, city name and state name etc.
- iv. And socio-demographic segments like age, population of both male and female etc.
- v. And also added few columns like Literacy rate in the respective cities with male and female divisions.

3.1 Data Pre-processing

In-depth Exploratory Data Analysis (EDA) is performed on the dataset which includes

- a. Data Cleaning
 - b. Checking and Handling Missing Data
 - c. Univariate Analysis
 - d. Bivariate Analysis
 - e. Data transforming (Converting categorical data to numerical data)
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- As the dataset which we have collected has no missing data, we started analyzing the dataset.
 - Separated Categorical and Numerical columns using `_get_numeric_data()` and `drop` functions.
 - Univariate analysis is performed on the columns like age, value counts of city and state names using Histograms and bar graphs.
 - Bivariate analysis is performed by taking two column pairs like `male_population` and `total_population` in a city and literacy rates of male and female etc.
 - Scatter Plots are used for bivariate analysis for clear understanding.
 - Employed Label Encoder from `sklearn` for transforming categorical data into numerical data.
 - And dataset is cleaned and Ready for Clustering.

4. Segment Extraction

Clustering

Clustering is one of the most common exploratory data analysis techniques used to get an intuition about the structure of the data. It can be defined as the task of identifying subgroups in the data such that data points in the same subgroup (cluster) are very similar while data points in different clusters are

very different. In other words, we try to find homogeneous subgroups within the data such that data points in each cluster are as similar as possible according to a similarity measure such as euclidean based distance or correlation-based distance. The decision on which similarity measure to use is application-specific. Clustering analysis can be done on the basis of features, where we try to find subgroups of samples based on features, or on the basis of samples, where we try to find subgroups of features based on samples.

PCA(Principal Component Analysis):

We have used Principal Component Analysis and have decreased the components and variability from 13 to 5 in the Final EV Data and then we have made 3D plotting and K-Means clusters.

K-Means Algorithm

K Means algorithm is an iterative algorithm that tries to partition the dataset into pre-defined distinct non-overlapping subgroups (clusters) where each data point belongs to only one group. It tries to make the intra-cluster data points as similar as possible while also keeping the clusters as different (far) as possible. It assigns data points to a cluster such that the sum of the squared distance between the data points and the cluster's centroid (arithmetic mean of all the data points that belong to that cluster) is at the minimum. The less variation we have within clusters, the more homogeneous (similar) the data points are within the same cluster. The way k means algorithm works is as follows:

- Specify number of clusters K

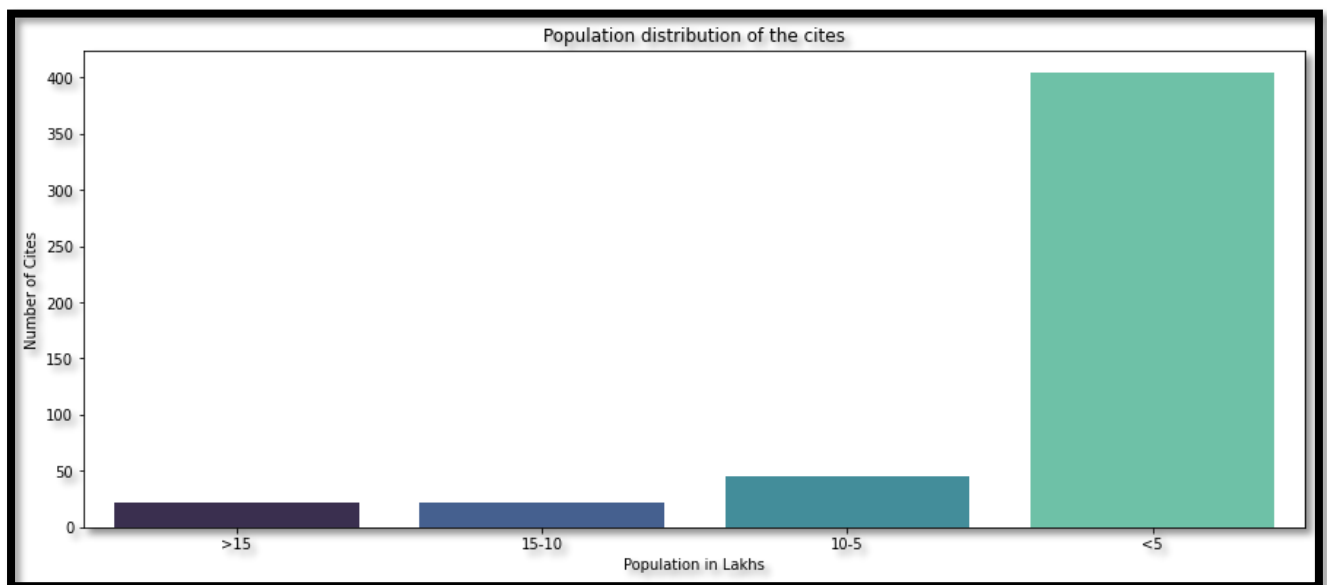
- Initialize centroids by first shuffling the dataset and then randomly selecting K data points for the centroids without replacement.
- Keep iterating until there is no change to the centroids. i.e. assignment of data points to clusters isn't changing.

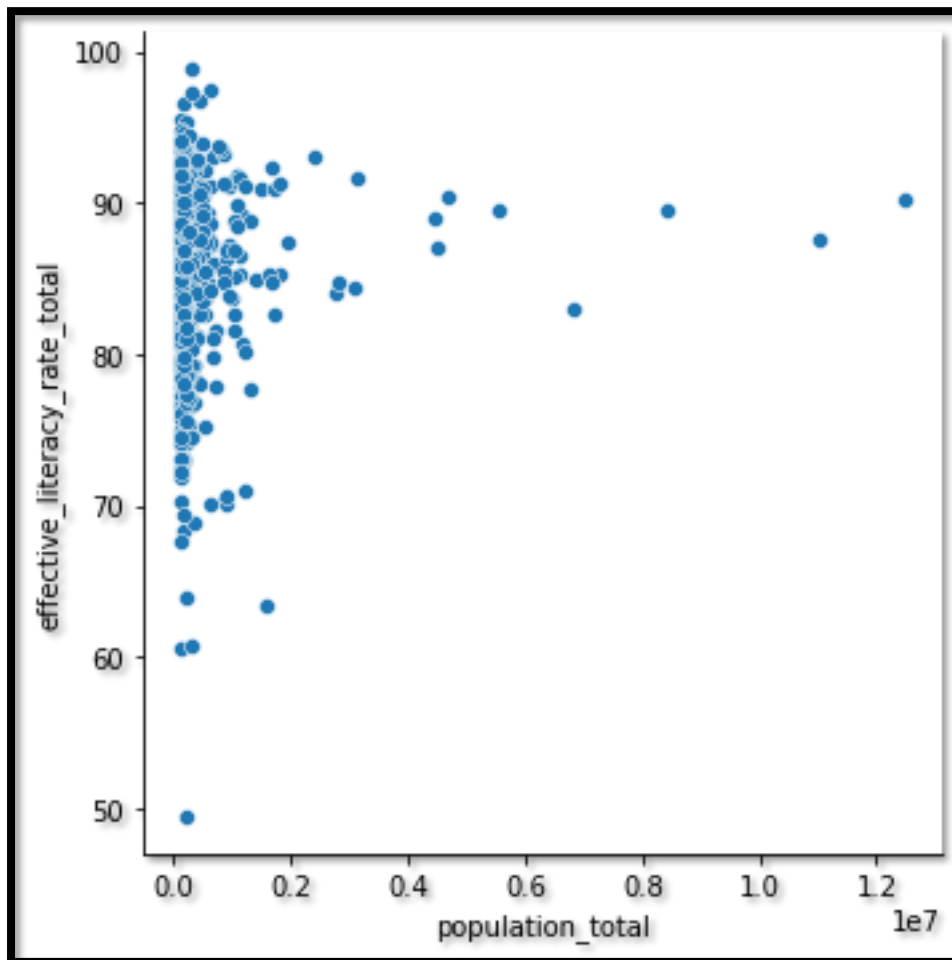
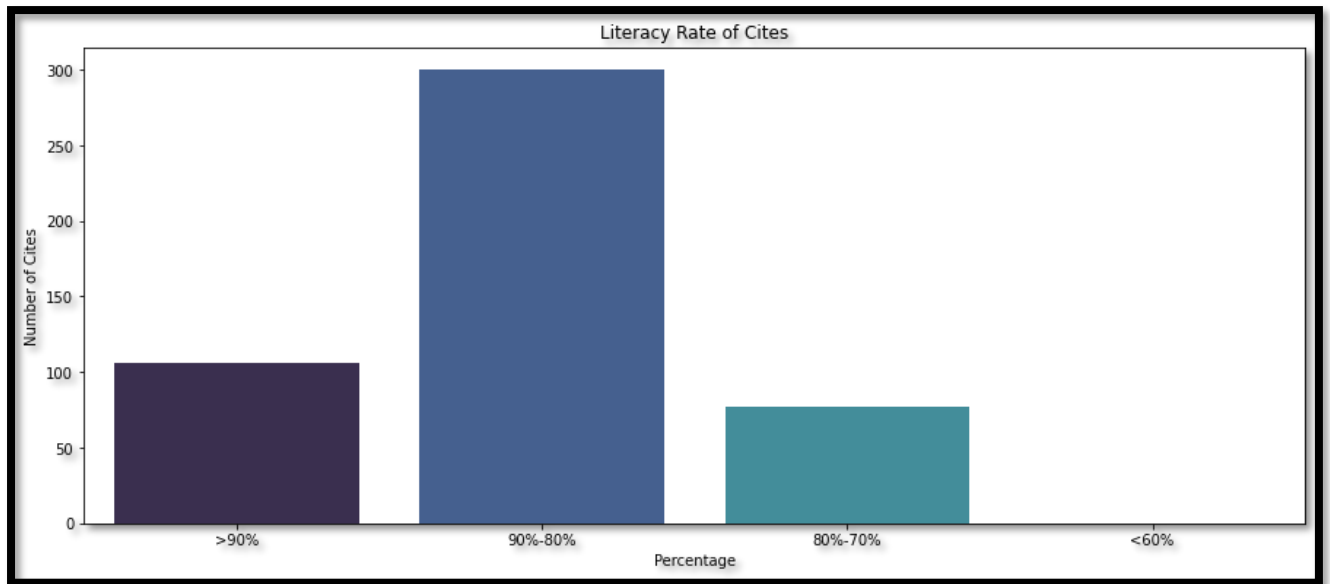
The approach that k-means follows to solve the problem is expectation maximization.

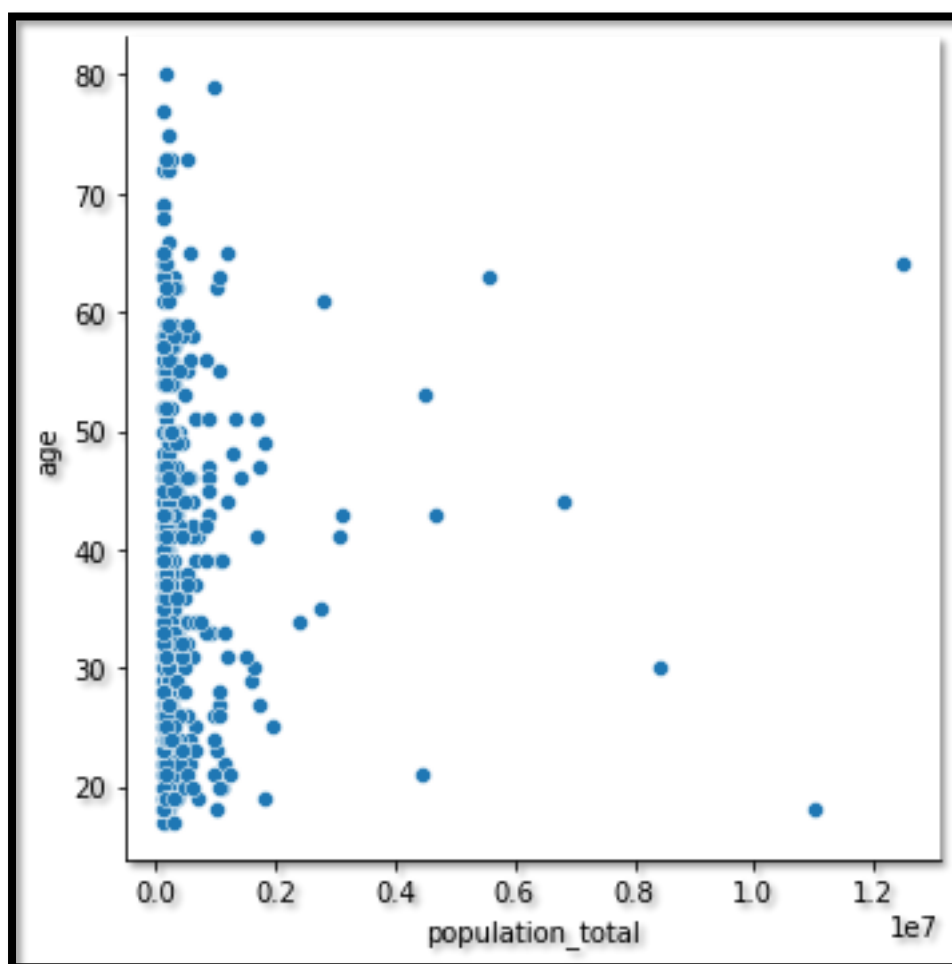
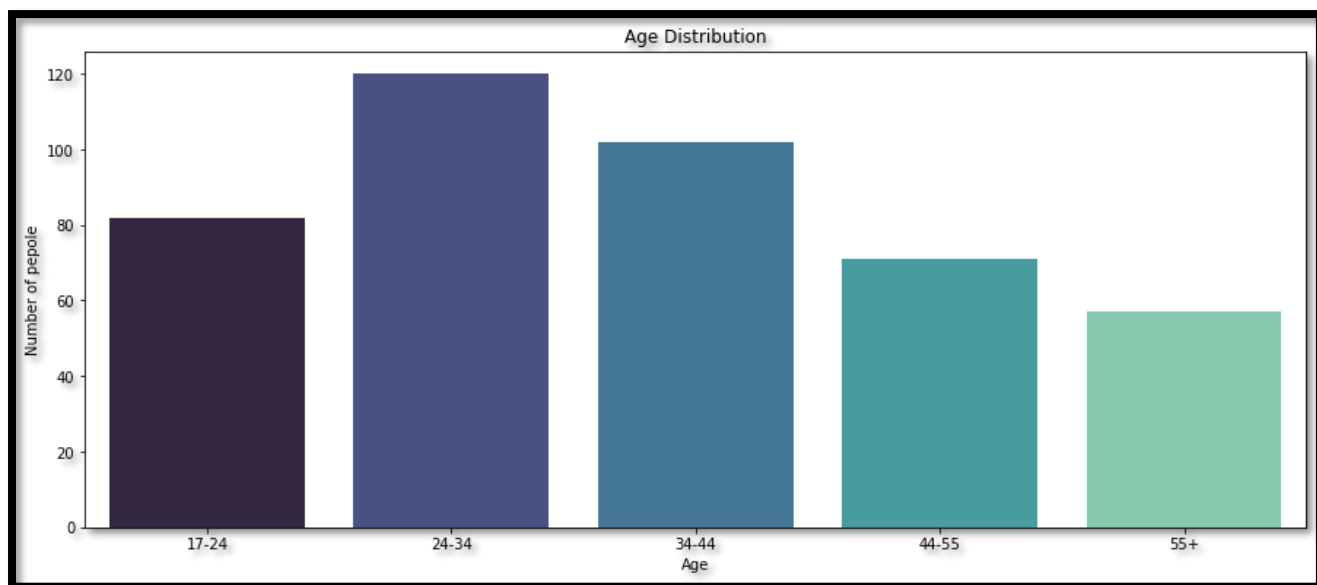
The E-step is assigning the data points to the closest cluster. The M-step is computing the centroid of each cluster.

Below is a breakdown of how we can solve it mathematically,

5. Selection of Target Segment







6. Customizing the Market Mix

The marketing mix refers to the set of actions, or tactics, that a company uses to promote its brand or product in the market.

The 4Ps make up a typical marketing mix -Price, Product, Promotion, and Place

Price: Refers to the value that is put on a product. It depends on the cost of production, the segment targeted, the ability of the market to pay supply-demand, and a host of other direct and indirect factors. There can be several types of pricing strategies, each tied in with an overall business plan.

- **Product:** Refers to the item actually being sold. The product must deliver a minimum level of performance; otherwise, even the best work on the other elements of the marketing mix won't do any good.
- **Place:** Refers to the point of sale. In every industry, catching the eye of the consumer and making it easy for her to buy it is the main aim of a good distribution or 'place' strategy. Retailers pay a premium for the right location. In fact, the mantra of a successful retail business is "location, location, location."
- **Promotion:** This refers to all the activities undertaken to make the product or service known to the user and trade. This can include advertising, word of mouth, press reports, incentives, commissions, and awards to the trade. It can also include consumer schemes, direct marketing, contests, and prizes.

All the elements of the marketing mix influence each other. They make up the business plan for a company and handle it right, and can give it great success. The marketing mix needs a lot of understanding, market research and consultation with several people, from users to trade to manufacturing and several others.

7. Market Segmentation

Target Market: The target market of online vehicle booking market segmentation can be categorized into geographic, sociodemographic, behavioral, and psychological segmentations.

Behavioral Segmentation

It searches directly for similarities in behavior or reported behavior. Example: prior experience with the product, amount spent on the purchase, etc.

Basic segmentation examines the characteristics and general activity of your customers (such as their geography, company size, website visits, form-filling activity, etc.). However, behavioral segmentation provides a more in-depth examination of consumer behaviors, including browsing preferences, current engagement and frequency, buying trends, and other online and offline behaviors. Customer behavior gives you the chance to influence them early and move them to the next step in the buying process since it is a reliable indicator of the customer's purchase intent or buying journey stage.

The Lead Intuition product, ACTIVE DEMAND, offers dynamic, real-time behavioral segmentation as the prospect interacts with you.

Psychographic Segmentation

Psychographic segmentation consists of grouping the target audience based on their behavior, lifestyle, attitudes, and interests. For understanding the target audience, market research methods such as focus groups, surveys, interviews, and case studies can be successful in compiling this type of conclusion.

1. Lifestyle: A consumer whose profession is more time-consuming than other average consumers, that consumer may select a vehicle that takes less time to arrive at selected location.
2. Behavior: The behavior of consumers is the most important factor in the market segment. Does it show what exactly consumers want from us?

Demographic segmentation

Demographic segmentation consists of dividing the market through different variables such as age, gender, nationality, education level, family size, occupation, income, etc. This is one of the most widely used forms of market segmentation since it is based on knowing how customers use your products and services and how much they are willing to pay for them.

Income: Income levels have a significant effect on consumer booking decisions. Those with higher-income levels may prefer luxury vehicles. Conversely, individuals with lower income levels may prefer to get the best deal on vehicles and are likely to choose inexpensive services.

Family size: family size also determines consumers' booking decisions. Those who have large family members may choose four-wheelers and those who have smaller family members will choose two-wheelers.

8. Fermi Estimation:

Total Population of India-1.4 billion.

Population in the range of 18-60 is the working population which approximated as $60\% = 1.4 \times (0.6) = 840$ million.

The population can be further divided according to their financial conditions and their requirements/Family sizes.

Considering the reports and survey employment ratio in India is 70%= 588 million.

The young Population who are unmarried is between 18-26 which further constitutes about 30% of the working population = $588 \times (0.3) = 176.4$ million.

9. Insights and Recommendation

It was assessed based on the value and insight it drew from the large volumes of monitoring data (much of which was previously unexplored), that could inform decision-makers of future work in the area. By this measure, the project was a success! Machine learning algorithms revealed patterns in the monitoring system data that lead to valuable insights.

Kmeans++ clustering algorithm was able to cluster the users in 5 different segments. Which are then analysed by business experts to formulate the results based on reservation behavior of users. These user profiles are Best conversion users, least conversion users These profiles can be used to understand the data in future. These profiles can help company to understand their user booking patterns and potentially help them to achieve better conversion rate, in turn better businesses