

Intelligent Destination Recommender and Community Builder

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Abstract—Recommendation engines make use of machine learning techniques and generally deal with ranking and rating of products/users. With the help of this system we aim to suggest different destinations to users based on their interest and previous visits. Along with recommendations we also aspire to enable users to build travel communities for people sharing similar interests. This shall help travelers with planning, meeting like-minded people, safety and enthralling experience.

As per the analysis done on pre-existing systems we discerned that enabling users to build a community of travelers visiting the same destination is an eccentric attribute proposed.

This distinctive attribute of building communities shall be implemented using the basics of clustering algorithms in Machine Learning.

Keywords- Recommendation system, Machine Learning, Travel paper, Intelligent system, Community builder, clustering etc.

I. INTRODUCTION

The tourism industry involves people traveling for leisure, social, or business purposes, both domestically and internationally. It is closely connected to the hotel, hospitality, and transport industries, and focuses on keeping tourists happy, occupied, and equipped during their time away from home. Maharashtra is a diverse state with a wealth of natural beauty, architectural wonders, culinary delights, and glamor. To promote tourism in Maharashtra, we plan to create a system that allows tourists to explore new places and connect with other travelers with similar interests. This will be done through the development of a simple and user-friendly application, with the goal of making travel a more enjoyable and stress-free experience.

For reference few similar working applications are :-

A. Trivago

What is trivago ?

It is a metasearch engine that compares accommodation prices and offers provided to us by many different online booking sites. They compare and display different offers from many booking sites, and they pay us a fee if a user clicks on their specific deal.[1]

B. Goibibo

What is Goibibo ?

Goibibo is India's leading online travel booking brand providing a range of choice for hotels, flights, trains, bus and cars for travelers. Through GoStays, our customers enjoy standardized stay experience at certified hotel properties. With industry first virtual travel booking currency GoCash and travel social network, GoCash+ Rewards – Goibibo is the number one choice for new India on the move.[2]

Goibibo has two supreme product features namely:

- 1) Anywhere to Anywhere flight bookings - This feature in Goibibo's product kit helps in curating the best fare options for the consumers owing to the international destinations to and from anywhere in the world.
- 2) Flight Advice - This one is essentially a search engine that helps users in finding results relating to their personal choice. This includes parameters such as price options, preferred destination routes and the duration of a flight.[2]

C. Makemytrip

What is MakeMytrip ?

Nurtured from the seed of a single great idea - to empower the traveler - MakeMyTrip is a pioneer in India’s online travel industry. Founded in the year 2000 by Deep Kalra, MakeMyTrip came to life to empower the Indian traveler with instant bookings and comprehensive choices. The company initiated its journey serving the US-India travel market offering a range of best-value products and services powered by technology and round-the-clock customer support.[3]

MakeMyTrip’s rise has been led by the vision and the spirit of each one of its employees, for whom no idea was too big and no problem too difficult. With untiring determination, MakeMyTrip has proactively diversified its product offering, adding a variety of online and offline products and services. MakeMyTrip has stayed ahead of the curve by continually evolving its technology to meet the ever-changing demands of the rapidly developing global travel market, steadily establishing itself as India’s leading online travel company.[3]

II. RELATED WORK

Delgado and Davidson were the first to create and use a travel recommender system. Despite the increasing interest in this field, the problem of extracting unique features to provide personalized travel package recommendations and forming group facilities remains an open challenge. This intelligent system uses a special Google Open Source API, including different services such as Google search API, Google Maps API, Google Distance Matrix API, and Google JavaScript services for Android and IOS.[4,5]

A. Recommender Systems in Itinerary building

In Travel and tourism, different approaches use different concepts in recommendation systems. Different kinds of recommendations are made in tourism. Among them are recommending tourist packages based on likelihood, similar tastes, tourist types, tourist activities, tourist expenses, tourist experiences, travel area, time, location, photos, and user attributes, which helps for collaborative filtering to find the ideal packages.

Social filtering is generally used in the tourism and travel industry, where all the information is being posted on social media like Facebook, Instagram, Flickr, Twitter, YouTube, and Quora. This information helps in giving personalized recommendations to the tourist, such as location check-in date, number of likes, and comments. Generally, tourism is affected by atmospheric phenomena such as floods, storms, and droughts. In the case of coastal tourism also, social information is used to build travel recommendation systems, and numerous obscure spots have the right to be visited.

However, individuals do not think rationally because of the unavailability of relevant open data made available through mobile devices. It records the tourist information like Point of interest (POI), location, availability of POI, geotagged photos, and recommending travel patterns.

Information about tourists is collected in the form of browser’s behavior as observed from previous engagement K-Means Clustering by using the attributes like a tourist destination, location, rating, and the price. In the paper, we can say that we are using Hybrid filtering in which Social information and user’s browsers behavior information are being used. Similarly, using user context information and social data, many recommendation systems are being developed using more than one algorithm and making a system with Hybrid functionality with all features. Hybrid filtering is applied in tourism with the help of Commonsense reasoning algorithms like common things in spending money, avoiding traffic, nearest path and several other factors to generate the intelligent travel scheduler Recommender Systems. It helps the independent traveler where a tourist is not required to depend on Package tourism.[6,7]

B. Community builder

A community is a group of people having similar interests which in traveling can be narrowed down to wanderers who wish to explore similar destinations. Studying formation of such communities is of utmost importance, several aspects need to be considered while doing so. Grouping users with similar interest gives a better vision while classifying individuals and sending friend requests.

For creating groups individual posts will be considered; interests will be extracted from this textual/pictorial content. Users sharing same interest of destinations shall be grouped together to enable them to plan vacations together. This shall help in making travel hassle-free. K-means clustering algorithm will be used to classify users.

III. LITERATURE SURVEY

Paper	Date of Publication	Author	Limitation
Travel Recommendation System using destination similarity	July 30, 2020	Hongliu CAO, Phd & Anna Tsolakou	No provision to form groups of travelers.
A Multi-Level Tourism Destination Recommender System	April 14, 2020	Hend Alrasheed ArwaAlzeer ArwaAlhowime INorashameri AishaAlthyabi	Lesser efficiency and more attributes

Tourism Recommendation System	September 27, 2021	Homaira Amzad, K. Vijayalakshmi	Provides only non-personalised recommendations.
Traveler's Recommendation System Using Data Mining Techniques	August 18, 2018	Shrikant Kokate; Ashwini Gaikwad; Pranita Patil; Manisha Gutte; Kalyani Shinde	Scope for improving accuracy.

Table 1. Survey Table

IV. SYSTEM DESIGN

A. System architecture

1) Existing Model

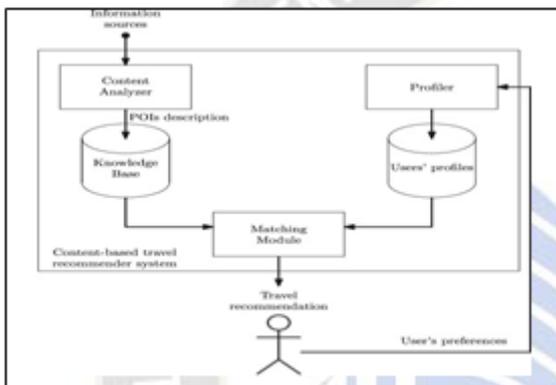


Figure 1. Existing Model

2) Proposed System

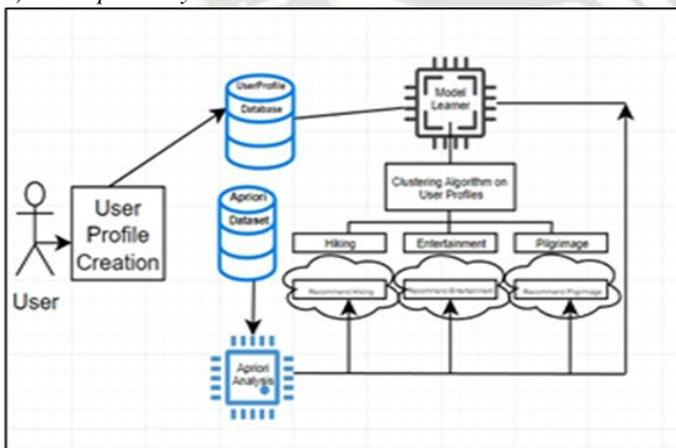


Figure 2. Proposed System

B. Flow of Trawell Application:

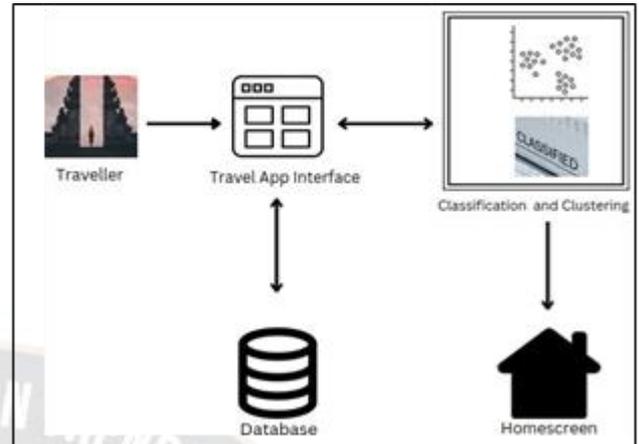


Figure 3 : Flow of Trawell Application

V. PROJECT IMPLEMENTATION

A. Overview of Project Modules

A project module is a self-contained unit of code that performs a specific function or set of functions within a larger software project. Modules can be written in a variety of programming languages and are often designed to be reusable, meaning that they can be imported and used in multiple different projects.

Modules are an important concept in software development because they help to organize and structure code, making it easier to manage and maintain. By dividing a large project into smaller, more focused modules, developers can work on specific parts of the project independently and then integrate their work together. This modular approach to development can also make it easier to test and debug code, as well as to update and extend the project over time.

There are many different types of modules that can be used in a software project, including libraries, frameworks, and plugins. Each type of module serves a specific purpose and may be designed to be used in different ways. For example, a library is a collection of code that can be imported and used to perform a specific task, such as interacting with a database or parsing text data. A framework, on the other hand, is a more comprehensive set of tools and libraries that provides a structured way of building and organizing an application.

Overall, project modules are a key component of modern software development, helping to organize and structure code in a way that makes it easier to understand, maintain, and extend.

Authentication for this app has two screen interfaces, including users logging in if existing on the app. In case of a new user, different Sign-Up services include Google Gmail, Facebook sign up, Email, and Password Sign up. Primarily, this app has a Mobile number SignUp method with an OTP-based authentication. This service helps to

increase the security of the app. Thereby users are trying to spam different account signup. This extra layer of security is maintained and kept encrypted, helping to reduce user privacy concerns.

1) User Registration

The home screen shall consist of a search bar and bottom navigation facility to provide the users with an easy-to-use interface. The user shall also view customized travel groups and destinations based on past interactions and preferred interests on the home screen.

2) Explore

Users will get recommendations of various places to visit. All the extracted travel information is presented to the user to efficiently help him/her know more about different attractions in terms of visual scenes. Given the start location, destinations, travel dates, and transportation budget information as the input, the system automatically recommends a route that suits the traveler based on a real-time routing planning algorithm and allows the user to adjust according to their preference. We shall also provide travel destinations and the best time to visit those places to get the best experience.

3) Add a post

This feature will help enhance social interaction as it will allow you to share media files such as videos, pictures, songs etc., as a part of your feed. It will provide you with a virtual treat of the travel experience of your favorite place just by sitting in one place. It will allow you to explore a new place with various content shared by multiple users, where you can even add your own experience via media files.

4) Texting/Sharing

Sharing the section will help the user and his travel associates look at new locations that the user has never explored. Along with this, one can save or bookmark the location he would like to visit or is interested in! In addition, there is a texting feature where users can chat with their friends, share posts, discuss and plan an itinerary. And the most exhilarating part is that the user will be able to find travel enthusiasts near him and go on some enticing expeditions. This app shall make traveling with companions of similar interest a pure bliss

B. Algorithm Details And Dataset

A1	DESTINATION	LEVEL(1,2,3)	CATEGORY(Adventure,Relaxation,Pilgrimage)	SEASON(Rainy,Summer,Winter,Ev)
1	DESTINATION	LEVEL(1,2,3)	CATEGORY(Adventure,Relaxation,Pilgrimage)	SEASON(Rainy,Summer,Winter,Ev)
2	Kalsubai Peak	3	Adventure	Winter
3	Nanaeghat	2	Adventure	Rainy
4	Kalgar Hills	1	Adventure	Evergreen
5	Bharmhagiri Hills	2	Adventure	Winter
6	Harishchandra	3	Adventure	Evergreen
7	Sandan Valley	2	Adventure	Winter
8	Hadsar	2	Adventure	Summer
9	Visapur	1	Adventure	Rainy
10	Lohgad	1	Adventure	Rainy
11	Ghangad	1	Adventure	Evergreen
12	Tail biala	2	Adventure	Summer
13	Korigad	1	Adventure	Rainy
14	Lingana	2	Adventure	Summer
15	AMK	3	Adventure	Winter
16	Chorla Ghat	1	Adventure	Winter
17	Varandha Ghat	1	Adventure	Evergreen
18	Author Seat Point	1	Adventure	Evergreen
19	Suryamal Peak	3	Adventure	Evergreen
20	Darya Ghat	2	Adventure	Evergreen
21	Mount Barry	1	Adventure	Winter
22	Savitri Point	1	Adventure	Evergreen
23	Mahabaleshwar	1	Adventure	Evergreen
24	Jivdhan	2	Adventure	Rainy
25	Plus Valley	2	Adventure	Rainy
26	Kataldhara	1	Adventure	Rainy
27	Rajgad	2	Adventure	Evergreen
28	Dhak Bhairi	3	Adventure	Winter
29	Rajgad	3	Adventure	Rainy
30	Devkund waterfall	1	Adventure	Rainy
31	Nanemachi Waterfall	2	Adventure	Rainy
32	Ali Baug	2	Adventure	Summer
33	Matheran	1	Adventure	Evergreen

Figure 4. Model Dataset

1) Apriori Algorithm

For getting recommendations of places based on user-selected attributes, the Apriori algorithm is used. The Apriori algorithm operates according to a straight forward principle. When the support value of an item set exceeds a certain threshold, it is considered a frequent item set.

Take into account the following steps:

- To begin, set the support criterion, meaning that only those things that have more than the support criterion are considered relevant.
- For a certain category in a certain season the favorable places are found using association rules and are then recommended to the user.

a) High-level overview of the Apriori algorithm:

1. Set the minimum support threshold and read in the dataset.
2. Generate all possible item sets of size 1 (single items).
3. Count the number of occurrences of each item set in the dataset.
4. Discard any item sets that do not meet the minimum support threshold.
5. Use the remaining item sets to generate association rules.

6. Generate all possible item sets of size 2 (pairs) and repeat the process from step 3.
7. Repeat the process for item sets of size 3, 4, and so on, until no more frequent item sets can be found.

The Apriori algorithm is widely used in a variety of applications, including market basket analysis, recommendation systems, and fraud detection. It is a simple and effective method for finding patterns and relationships in large datasets, and it has been successfully applied to a wide range of real-world problems.

Overall, the Apriori algorithm is a reliable and effective method for finding frequent item sets and extracting association rules from large datasets. It is a valuable tool for data mining and machine learning tasks and has been widely used in a variety of applications.[8,9]

b) Apriori Algorithm in generating recommendations:

The Apriori algorithm can be used to generate recommendations in a variety of contexts, such as recommending products to customers based on their past purchases or recommending movies to users based on their ratings.

Here's an example of how the Apriori algorithm might be used to generate recommendations for a retail store:

1. Collect data on travelers from his travel records.
2. Use the Apriori algorithm to identify frequent item sets (i.e., sets of places that are frequently visited together) in the data.
3. For each visitor, create a list of the places they have visited.
4. For each place that a traveler has visited, find the frequent item sets that contain that place.
5. Use the association rules generated by the Apriori algorithm to recommend additional places to the traveler that are frequently visited with the places they have already visited.

In this way, the Apriori algorithm can be used to generate personalized recommendations for travelers based on their past traveling behavior.

It's important to note that the Apriori algorithm is just one method that can be used to generate recommendations. There are many other algorithms and techniques that can be used, and the choice of which method to use will depend on the specific needs and goals of the recommendation system.

b) K-means clustering:

1. Choose the number of clusters you want to find which is k.
2. Randomly assign the data points to any of the

clusters.

3. Then calculate the center of the clusters.
4. Calculate the distance of the data points from the centers of each of the clusters.
5. Depending on the distance of each data point from the cluster, reassign the data points to the nearest clusters.
6. Again calculate the new cluster center.
7. Repeat steps 4,5 and 6 till data points don't change the clusters, or till we reach the assigned number of iterations.[10,11]

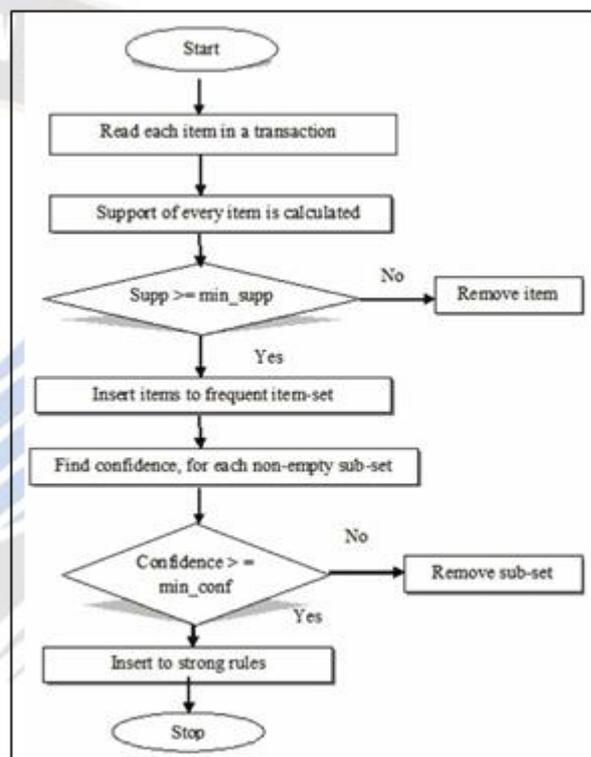


Figure 5. Apriori Algorithm

2) K-Means Clustering

a) K-Means Analysis:

K-means analysis is a machine learning technique, which groups the unlabelled dataset. It can be defined as "A way of grouping the data points into different clusters, consisting of similar data points. The objects with the possible similarities remain in a group that has less or no similarities with another group."

It does so by finding some similar patterns in the unlabelled dataset such as shape, size, color, behavior, etc. and divides them as per the presence and absence of those similar patterns. It is an unsupervised learning method, hence no supervision is provided to the algorithm, and it deals with the unlabeled dataset. After applying this clustering technique, each cluster or group is provided with a cluster-ID.

ML systems can use this id to simplify the processing of large and complex datasets. To store user information at the backend we will make use of google firebase. Firebase is a development platform for mobile and web apps. With Firebase, you can quickly build high-quality apps, grow an engaged user base, and earn more money.

b) K-Means algorithm in building communities

K-means clustering can be used to form communities of like-minded people by grouping individuals based on their similarities. This could be done by collecting data on the characteristics or preferences of the individuals, such as their age, gender, interests, and so on. The K-means algorithm could then be used to cluster these individuals into groups based on the similarity of their characteristics or preferences.

For example, suppose we have a group of individuals who have filled out a survey about their interests and hobbies. We could use the K-means algorithm to cluster these individuals into groups based on their interests and hobbies. This would allow us to identify communities of like-minded individuals who share similar interests and hobbies.

It's important to note that the K-means algorithm is just one method that can be used to group individuals into communities. There are many other clustering algorithms and techniques that could also be used, and the choice of which method to use will depend on the specific needs and goals of the community formation process.

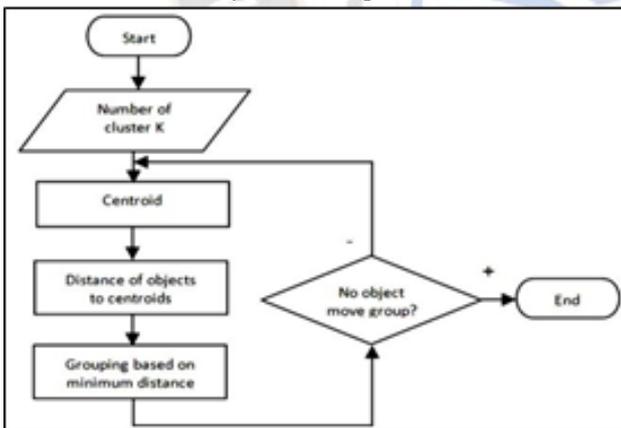
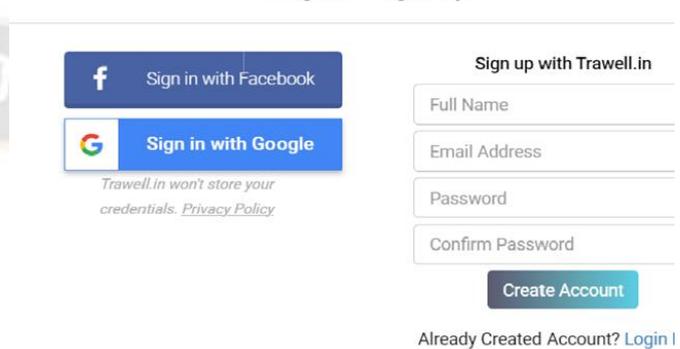


Figure 6. K-means Algorithm

VI. RESULTS



Login / Sign-up



In our project the main outcome is for tourists to be able to receive smart destination recommendations and community building features to explore new places.

One potential outcome of a travel recommendation app is an improved travel planning experience for users. By providing personalized recommendations based on the user's past travel history and preferences, the app can help users to quickly and easily find destinations, hotels, and activities that meet their individual needs and interests. This can help to reduce the time and effort required for users to plan their travels, allowing them to focus on enjoying their vacation.

In addition, a travel recommendation app can also help users to discover new and exciting travel destinations that they may not have otherwise considered. By providing a range of recommendations based on the user's preferences and interests, the app can help users to explore new areas and experience new cultures and activities.

Overall, the main outcome of a travel recommendation app is to provide users with a convenient and effective tool for finding and planning their travels, while also helping them to discover new and exciting destinations and experience.

VII. CONCLUSION

This travel application helps to give the user a more personalized recommendation for both finding companions and destinations. It is a perfect amalgamation of traditional applications and ML techniques that will give this a cutting edge over the pre-existing systems.

Our optimistic approach towards the application will mainly focus on upgrading it with various new technologies and

trends, i.e. we can add a suggestion tip about the cuisine, tradition, and cultural aspects of the places. Our second motto will resolve all user-faced issues within minimum time.

In conclusion, the travel recommendation system that utilizes the apriori algorithm has proven to be an effective tool in suggesting travel destinations to users. By analyzing the travel patterns and preferences of previous travelers, the system is able to generate personalized recommendations for each user, increasing the likelihood that they will have a satisfying and enjoyable trip.

The use of the apriori algorithm also allows for efficient processing of large amounts of data, ensuring that recommendations can be generated quickly and accurately.

Overall, the travel recommendation system utilizing the apriori algorithm is a valuable resource for travelers looking to plan their next vacation.

REFERENCES AND LINKS

- [1] <https://www.trivago.in>
- [2] <https://www.goibibo.com>
- [3] <https://www.makemytrip.com>
- [4] Delgado, J., & Davidson, R. (2002). Knowledge Bases and User Profiling in Travel and Hospitality Recommender Systems. Proceedings of the ENTER 2002 Conference, page 1-16. Springer Verlag
- [5] Fesenmaier, D. R., Ricci, F., Schaumlechner, E., Wöber, K., & Zanella, C. (2003). Dietorecs: Travel advisory for multiple decision styles. In Information and communication technologies in tourism 2003 (pp. 232- 241). Springer Vienna
- [6] Qureshi, D. I. ., & Patil, M. S. S. . (2022). Secure Sensor Node-Based Fusion by Authentication Protocol Using Internet of Things and Rfid. Research Journal of Computer Systems and Engineering, 3(1), 48-55. Retrieved from <https://technicaljournals.org/RJCSE/index.php/journal/article/view/41>.
- [7] Tourism Recommendation System: A Survey and Future Research Directions. (2022). Amrita Vishwa Vidyapeetham
- [8] Tourism recommendation system: a survey and future research directions. (2022). Multimedia Tools and Applications
- [9] Benjamin Jackson, Mark Johnson, Andrea Ricci, Piotr Wiśniewski, Laura Martínez. Ethical Considerations in Machine Learning Applications for Decision Science. Kuwait Journal of Machine Learning, 2(4). Retrieved from <http://kuwaitjournals.com/index.php/kjml/article/view/221>
- [10] Algorithm of Apriori-Based Rural Tourism Driving Factors and Its System Optimization Method. (2022). Mobile Information Systems
- [11] Research on Tourism Service Intelligent Recommendation System Based on Apriori-MD Algorithm. (2015). Applied Mechanics and Materials
- [12] Using K-Means to Cluster Users and Recommend Similar

Trip Destinations. (2021). Medium

- [13] Ahmed Abdelaziz, Machine Learning Approaches for Predicting Stock Market Volatility , Machine Learning Applications Conference Proceedings, Vol 3 2023.
- [14] Implementing K-Means Clustering Algorithm in Collaborative Trip Advisory and Planning System. (2019). ResearchGate