Intelligent Globetrotting Information System using Association Rule Mining Algorithm

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Abstract - *As the data pertaining tourism increases due to various sources, it becomes extremely difficult to appropriately and rapidly obtain the suitable information. One way to resolve this issue is through Recommendation Systems. This paper offers the underhanded of an intellectual tourist recommendation system that runs on Apriori algorithm of association rule, by building tourists' activities - interest model .The approaches used for designing the system and implementation are explained. The proposed method deploys number of location tags and combines travel pattern, ratings and distance preference factors to provide tailored recommendation. The system utilizes content based filtering to recommend items based on user requirements and apriori algorithm is used for pulling out recurrent item sets. Hence providing high degree of personalized recommendation for better user experience.*

*Keywords***: Apriori; Intelligent Recommendation; Mining; Association Rules; Personalized Tourism; Content-based Filtering; KNN;**

1. INTRODUCTION

The tourist industry is rapidly growing and has a great impact on the economy at local, state and national levels. Also, in this technological era the number of information technology applications in tourism is increasing. But, the need for convenient and intelligent services should be satisfied. There is a need for acquisition of useful information in a convenient and efficient manner.

The information provided to the user is massive and it becomes difficult for the user to make a decision out of this enormous data. Thus, the idea in this paper is to use recommendation system that filters information, that is otherwise massive and also make predictions based on user preferences. With the help of recommendation system, tourists can efficiently make decisions. The personalized recommendation system gives the users the content based on the knowledge of their preferences.
To achieve the personalized recommendation, we use the Apriori algorithm of association rule learning, by the construction of tourists' behavior-interest model. For the purpose of finding interesting associations and relationships among large sets of data items Association rule mining is is used. Thus, the idea is to fill the gaps by noting what a tourist perceives as relevant.

1.1 Existing Approach

The various existing information technology applications providing tourism services lack an efficient recommendation system. A person visiting a new place needs to go through huge data to make decision. It needs to improvise on recommendation system and provide suggestions based on user preference.

Drawbacks in the existing system-

1. In the traditional tourism system, the recommending performance and accuracy have not reached the requirement.
2. The most challenging thing in existing tourism system is choosing the right place to travel among the various options available.
3. It is not possible to find a place based on the distance within which a user wishes to travel.
4. People have to gather data that are present in brochures, hire the tourist guides and search on various web pages.
5. There is no provision of finding suitable scenic places using user criteria.

2. PROPOSED SYSTEM

The proposed system intends to give the tourists a better experience. Its purpose is to make decision making process of an user easy and also time and cost effective. The user just needs to answer few simple questions like his/her current location, preferred kind of place, budget, radius within which he/she would like to travel.

Advantages of the proposed system-

1. The purpose of this project is to overcome the disadvantages of the existing tourism recommendation system.
2. It recommends personalized tourism spots using Apriori algorithm of association rule, by constructing tourists' behavior - interest model based tourism spot recommendation framework and formulate recommendation methods in personalized tourism service.
3. Its purpose is to increase accuracy in tourist spot recommendation.

4. It improves tourism experience so that tour is more significant to tourism industry development and tourists' traveling.

5. It highly increases the satisfaction of the user since it is customized.

6. The algorithms being used, produces highly improved performance.

3. BACKGR0UND

A. Recommendation System

The function of recommender system is filtering information that makes forecasts on user preferences and makes recommendations which should interest customers. The usage of recommendation system can be seen under a wide range of domain, some of them are movies, music, news, books, research articles, search engine, e-commerce, social media, and products in overall, each tuple to show that they belong to the same group. Original values and anonymized values can be represented as a bipartite graph and the order is changed in order to not recognize the tuple. Each edge in the graph denotes a possible identity.

B. Tourism Recommendation System

Recommender System is a software providing suggestions for things to be of usage to users. The ideas or recommendations are provided such as which place to go, what articles to read, or what games to play, are meant to support the users in various choice-making procedures. In the travel domain, apprehending the feedback of the user along with analytics on the travel planners use and preferences makes it possible for a knowledge base to be assembled.

The key factors that measures recommendation algorithm is its precision. When the recommendation list outputted by the system does not meet the users' requirements, user will lose his/her hang in the system and will probably be ignoring the further recommendations made by the system in future. The recommendations done by system is grounded on the user histories, thus there is a requirement to personalize the result as possible so that the user is satisfied.

In tourism recommendation systems, the users and data items considered are very huge. But traditional recommendation system uses partial information to parse down the data and for classifying similar users' characteristics. The chief approach used in any of recommendation system is content-based filtering, which provides recommendations that are easy to understand. Content-based filtering is based on similarities of user choice like interests, ratings, likes and dislikes. Hence the recommendation given by Content-based is not

considered to be a quality recommendation. Recommendation using association rule mining gives us high support and confidence level. So it is considered to be a strong recommendation. The combination of both Content-based filtering and association rule mining gives user a strong and quality recommendation although the user has inputted insufficient data as per his/her knowledge. The paper combines recommendation for tourism application by using a combination of modern Content-based filtering technique and data mining techniques.

Tourism recommendation systems map user necessities and inclinations, through appropriate recommendation algorithms, and adapt them into recommendations of a small subset of locations out of a very large set. Knowledge about the locations and consumers is pulled out from either domain experts (in content recommendation approaches)or the analysis of previous purchase and recommendation histories. Furthermore, the recommendations are presented to the user/consumer together with a rationale for the fundamental recommendation.

4. OBJECTIVES

Intelligent Globetrotting Information System achieves the following objectives-

1. To make an efficient and user friendly information system for tourists.

2. Providing customised suggestions based on the answers given by the users.

3. To solve the problem of encountering with massive data just by asking a few questions.

4. To help users make their decisions quick in a cost effective way.

5. SYSTEM DESIGN

A. Data Sets

We base our project on data sets that were collected from different websites with different characteristics like city, latitude, longitude, landmarks. This raw data is subjected to preprocessing which includes data cleaning, integration, reduction and transformation that makes the data suitable for providing effective results. It contains tagged data to instruct the ML algorithms used in our system.

B. Distance Based Filtering

A tourism recommendation system asks for user the radius within which he/she would like to visit. This user

input can be compared against dataset to provide the result of places whose distance lies within given radius. Following is the method that can be used for distance based filtering in our project

1. Take the coordinates of current location of the user.

2. Take the radius of distance within which the user would like to travel.

3. Uploads the appropriate dataset.

4. It would check the contents of the dataset for the calculated range and returns only the ones that returns true in the test as a new database.

C. k Nearest Neighbors(KNN) algorithm

This algorithm can be used to filter out the suitable place based on user requirements. It provides set of places that satisfies the user opinions like rating. It is a model and memory based algorithm.

Given a user criterion:

1. Find distances between these criteria and all other items.
2. Pick k shorter distances which are 5 in our case.
3. Instruct the algorithm for this value of k.
4. Returns the nearest k items present in the dataset.

D. Association Rules and Apriori algorithm

The functionality of Association rule mining is to figure out appealing associations and relationships for huge data sets. This rule shows how frequently a itemset occurs in a transaction.

Rule evaluation metrics-
1. Support
2. Confidence
3. Lift

The Association Rule Learning basically helps us in finding the likelihood of a globetrotter visiting a second place, depending on their current liking and recommending them the place with higher probability.
The Apriori Algorithm being used in this paper proceeds by noting the places in the dataset following by adding more and more places as long as they appear together often enough in the dataset. We check this Algorithm for a particular place selected by the user and produce the result of this algorithm as a recommendation accordingly.

Once this algorithm is applied we get a set of rules using which we can recommend substitutable or complementary places to the users.

The place is recommended based on the place that is selected by the user from the result of KNN algorithm.

6. RESULT

The user registers with the system and is asked for his interests. The user receives personalized recommendation based on a set of questions he/she answers , such as their budget, the radius within which they wish to travel, stay duration(in days) and the kind of place they wish to visit.

Table 1 Part of the user database

User	Current Location	Distance	Number of days	Place	Budget
Srihith	Mysore	500	3	Historical Place	50,000
Richa	Kolkata	700	6	Dam	50,000
Rahul	Delhi	300	2	Fort	70,000

The system is based on the data set, collected from various websites with different characteristics like city, latitude, longitude, landmarks which is preprocessed. The distance based filtering uses - the coordinates of the current location of the user, distance preferred by the user and checks for matching datasets and returns the matching datasets as a new database.

Table 2. Part of the Dataset

City	Latitude	Longitude	Landmark	State
Abohar	30.15	30.15	Gurudwara	Punjab
Baramati	18.21	74.61	Hindu Temple	Maharashtra
Kanya kumari	8.18	77.43	Beach Hindu Temple Fort Palace	Tamil Nadu
Vellore	12.94	79.15	Fort Hindu Temple	Tamil Nadu

The association rule and Apriori algorithm together give the following kind of result shown in table 3.

Table 3. Part of the result given by Apriori algorithm

Rule	Support	Confidence	Lift
Manali → Kulu	0.03	0.5	1
Mangalore → Udupi	0.04	0.5	1
Ahmedabad → Gandhinagar	0.02	0.5	1
Allapey → Kochi	0.01	0.5	1
Cuttack → Bhubaneswar	0.05	0.5	1

7. CONCLUSION

The goal is to make an efficient and user friendly information system for tourists that provides customized suggestions based on the answers given by the users. Our proposed system tries to solve the problem of users encountering with massive data just by asking a few questions that needs to be answered by the user. The target of the proposed system is to help users make their decisions quick in a cost effective way.

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