ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

INTELLIGENT TOUR GUIDE

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Abstract—IntelligentTourGuidesystem,arevolutionarytravel planning solution that offers personalized tour package recom- mendations tailored to user's location and budget preferences. Developedbasedonin-depthfieldandliteraturesurveys,thissys- tem addresses existing industry gaps by integrating an adaptive, budget-aware recommendation engine. Our innovative system designblendscutting-edgetechnologyanduser-centricprinciples, creating a dynamic recommendation engine and an intuitive frontend interface for effortless user engagement. The report details the system's implementation, spanning from database to userinterfacedesign,anddiscussesusecases,affirmingitsrobust functionality across diverse scenarios. Rigorous experimentation and result analysis, using diverse datasets, verify the system's efficiency and effectiveness, echoing positive user feedback. In essence, the Intelligent Tour Guide system represents a new eraof smart, personalized tourism, exemplifying the transformative potential of advanced technology in the travel industry.
IndexTerms—Tourism,Web,React,MongoDB

I. INTRODUCTION

Tourism 2020 Vision of the World Tourism Organization gave forecasts till 2020, with 1995 as the base year. WTOsees no significant change in the trends of the forecast. The experience and studies in the past show that in the short term, periods of faster growth (1995, 1996, 2000) alternate with periods of slow growth (2001 to 2003). The pace of changetill 2000 exceeded the Tourism 2020 Vision forecast and is expectedtogrowinthefuture.Tourismisthethirdlargest net earner of foreign exchange for the country and one of the sectors which employ the largest number

ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

of manpower. It is estimated that tourism in India will contribute 8.5 crores tothe GDP by 2020. The overall fund allotment for the Tourism Industry in the 10th Five-year plan was Rs.2900 crores as against Rs.750.00 crores in the 9th Five year plan period. The Government of India is heavily promoting tourism, focusing primarily on its resources and strengths and innovative plans andstrategies.OutofthetotalINR2400croresallocatedtothe MinistryofTourism,themajorportionoftheoutlayamounting to INR 1742 crore is allocated for the development of tourism infrastructure and an amount of INR 242 crore for promotion and branding.

II. NEEDOFTHEPRODUCT

A. Whyistheproductneeded?

As there are different applications or software available in the market. The different software proposes different aspects of tourism. As all the different applications are not giving satisfactoryresultstotheusers.Theydonotprovidethewhole travelling plan based on the user experience. If you fail in offeringrelevantinformationtothecustomer,theywillnot be satisfied nor will they spend as much as they may have planned.Thisiswhyit'svitaltohaveachannelwheretheflow of information to the customer will be constant and two-way, unlike traditional channels which did not have customization possibilities nor could they provide precious feedback. They provide a poor selection of places to the user. As different applications give different results and they are unsatisfactory totheuserexperience.Tosatisfytheuserexperiencegivesthe satisfactory recommendation of tourist places.

B. ExistingSystems

There are different applications available in the market like Goibibo, TripAdvisor, etc. These different applications are providing results based on the user's search of places where the user wants to go for tourists. As the user searches for different places, these applications provide them with some unreliable options. So the user gets unsatisfactory answers for recommendingplaces.Ourmainobjectiveistosatisfytheuser withtheprovisionofplacesfortourism.Wealsogivedifferent places for staying in that region. We are providing the user with the type of place he/she can visit like historic places, ritualplaces,beaches,etc.Weprovidegoodrecommendations of places to visit users based on the user criteria.

III. LITERATURESURVEY

Mobile Travel Guide using Image Recognition and GPS/Geotagging. In this paper, they are using a mobile in- tegrated camera for displaying tourist places by making useof mobile inbuilt GPS for the location and then providing the relevant details about that region or tourist place. They use Geotagging to save the relevant details of the place in the metadataoftheimageswhichweretakenatthattime.This is useful for recollecting the details of the places which were visited.

A Hybrid Method for Recommendation Systems Based onTourismwithanEvolutionaryAlgorithmandTopsisModel. This paper talks about recommending tourist places based on user inputs using a machine learning model. This paper is providing different recommendations by using the TOPSIS model which takes care of multi-criteria

ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

recommendations of places. This model takes care of the multiple criteria of the user for recommending the places.

An Extensible and Personalizable Multimodal Trip Planner.ThispaperrepresentsthattheyusetheMLmodel for recommendation where they provide the recommendation onlyofoneplacewhichdoesnotsatisfytheuser'sneed for the places for planning trips. They don't provide good recommendations for the places. They also do not provide the details of the places around that region.

C. Applicationofproduct

The application will be available to the common public which will help the common people by giving accurate in- put/recommendations via input from users. The system en- tices users with relevant suggestions based on the choicesthey make. So instead of searching for tourist locations, and accommodation one by one for every city each time you want totravel,weprovideasingleplatformforallthesepurposes.

D. Novelty

Currently, available models or apps let users decide on the location and give relevant information about that single place which consists of only the accommodation (i.e., hotels) and modeoftransportation.Wecombinethisavailablemodelwith MLrecommendationswhereuserswillbegivenmultipleloca- tions based on several factors and display related information aboutthoselocationssimultaneouslywhilegivingusersaccess to features like budget planning, tourist locations in the city etc.

E. Scopeofproject

- AddingWeatherasavariableintheMLmodel
- Booking the hotels around the preferred location is also done by the app.
- Showing the details of the Tourist place using Geoloca- tion

IV. PROBLEMFORMULATION

A. FormulatingProblem

Currently, available tourism apps only focus on a trip's ac- commodationandtravellingsector,ignoringtheotheraspects. We solve this by providing a complete trip guide from the selection of location to places to visit and accommodate the user while giving merits like multiple options, Geo-location, budget planning etc. to the user.

B. ProductObjectives

Due to the rapid expansion of the internet, users are in an information overload state where there is a need for a system that provides related and useful information from the big pool of information. This kind of system is needed in the tourism sector. Our product takes into account the current problem of all such tourism apps being money-driven and misleading and focuses on developing a model which includes more features and not only accommodation.

V. PROPOSEDDESIGN

ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

Year	Name	Author(s)	Strength	Research Gap
2021	Research on Night Tourism Recommendation Based on Intelligent Image Processing Technology	Meng Li1,Ning Fan	Need for recommendation systems in travel industry well explained. Information regarding Attempt to solve Night tourism drawbacks and problems by focusing on night image enhancement methods	Sentimental Analysis can be added, recommending only one location at a time thus providing less option to user
2022	A Hybrid Method for Recommendation Systems based on Tourism with an Evolutionary Algorithm and Topsis Model	Saman Forouzandeh, Mehrdad Rostami & Kamal Berahmand	Used for recommending tourist places based on the user preferences using TOPOSIS model which take care of multi-criteria	Increase the accuracy using different models and recommend multiple places based on user preference
2019	An Extensible and Personalizable Multi-Modal Trip Planner	Xudong Liu, Christian Fritz, Matthew Klenk	Uses the user hard or soft constraints (like mode of transport, gives route till destination). Also take care of the personalization	Showing 3D view of routes and places in the map. Also add the different users preferences for the suggesting tourist places & planning routes.
2020	Mobile Travel Guide using Image Recognition and GPS/Geo Tagging	Ramsha Fatima, Iffat Zamin, Muhammed A. Qadeer, M. Sarosh Umar	It recognize a tourist place from the picture clicked/uploaded by the user and displays the information about tourist place and able to point the location on the map.	It store the details of visited place in the database for the accessing in future also give new recommendation other than previous recommendations.

Fig.1.FlowoftheApplication.

Basicflowofapplication

The basic design flow gives the basic idea of the workingof the application where the first we get a page where wehave to create the user for the login in the application. After the creation of the user we have to login through email & passwordwhichauthenticatestheuserdetails&logintheuser. After which the user can search the location & give the names oftheplacewherehewantstovisit.Theusercanchoose the different preferences of places like trek, honeymoon, religious, etc. from those preferences and search the places under that category. The user gets different recommendations of places from which he/she can see more information about therecommendedplaces.Theyalsocanchoosetoaddthat

location in the cart view tab for future reference and are easily accessible.

VI. IMPLEMENTATION

- Recommendedplacesforusers'preference

Here,A ·Brepresentsthedotproductofvectors A and B,and‖A‖and‖B‖representthemagnitudes(ornorms)of vectors A and B, respectively.

The cosine similarity ranges between -1 and 1. A value closeto1indicatesahighsimilarity,whileavaluecloseto -1indicatesahighdissimilaritybetweenthevectors.

B.EuclideanDistance

Measuring the distance between two vectors is the simplest method for determining similarity. Using the Pythagorean theorem,wecalculatethedistancebetweenthetwopoints in Euclidean distance. More similarity exists between two vectors when the Euclidean distance between them is smaller. Its formula is given as:

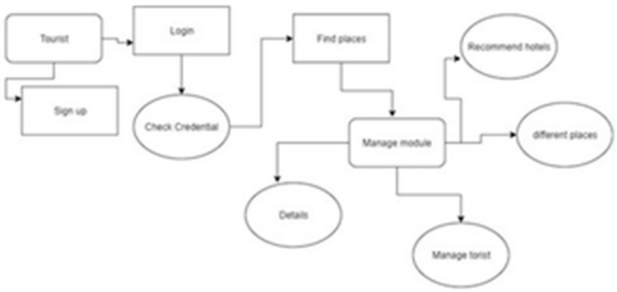

Fig.2.ComparisonofExecutionTimes

ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

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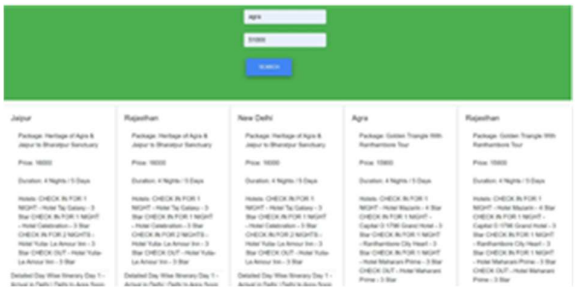

- Detailed itinerary and detailed hotel view based on user preference.

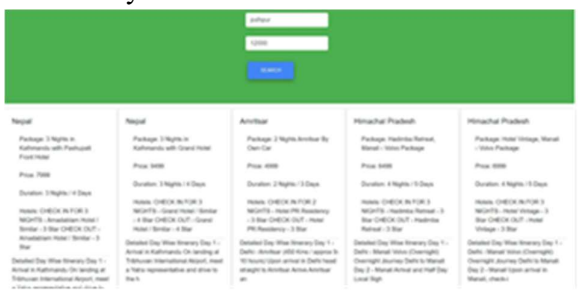

Fig.3.ComparisonofExecutionTimes

VII. SIMILARITYMETRICS

A.CosineSimilarity

Cosine similarity is a mathematical measure used to deter-minethesimilaritybetweentwovectorsinamulti-dimensional space.Itiswidelyusedinvariousfields,includinginformation retrieval, natural language processing, and recommendation systems.

Thecosinesimilaritybetweentwovectorsiscalculated basedonthecosineoftheanglebetweenthem.Thevectors arerepresentedasarraysofnumericalvalues,whereeach element of the array corresponds to a dimension in the multi- dimensionalspace.Themagnitudeofthevectorsdoesn'taffect thecosinesimilarity;onlythedirectionofthevectorsmatters.

Given two vectors A and B, the cosine similarity (similarity) can be computed using the following formula:

nA·B A· B

One drawback is the lack of orientation considered in the calculation, i.e. it is based solely on magnitude. Euclidean distance works well on low-dimensional data and when the magnitudeofthevectorsisimportanttobemeasured.Methods like kNNand HDBSCAN show great results if Euclidean distance is used on low-dimensional data.

ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

C.JaccardSimilarity

TheJaccardsimilarityisameasureofthesimilaritybetween two sets, widely used in various fields, including information retrieval, data mining, and natural language processing. It measurestheoverlaporsimilaritybetweentheelementsofthe two sets. The Jaccard similarity coefficient ranges between 0 and1,where0indicatesnosimilarityand1indicatescomplete similarity. A higher Jaccard similarity coefficient indicates a higher degree of similarity between the two sets. The Jaccard similarity between two sets A and B can be calculated using the following formula:

$$J(A,B)=\frac{|A\cap B|}{|A\cup B|}$$

where|A|representsthecardinalityofsetA,|B|represents the cardinality of set B, A∩B represents the intersection of setsAandB,andA∪BrepresentstheunionofsetsAand B.

D.Pearson'scoefficientco-relation

ThePearsoncorrelationcoefficient,denotedasr,isa measure of the linear relationship between two variables. It ranges from −1 to 1, where −1 indicates a perfect negative linearrelationship,0indicatesnolinearrelationshipand1 indicatesaperfectpositivelinearrelationship.Theformula

forcalculatingthePearsoncorrelationcoefficientbetweentwo variables Xand Yis given by:

$$(Xi-\bar{X})2(Yi-\bar{Y})2$$

Here,XiandYiaretheindividualobservationsofthevari- ables, and $\bar{X}$and $\bar{Y}$are their respective means.

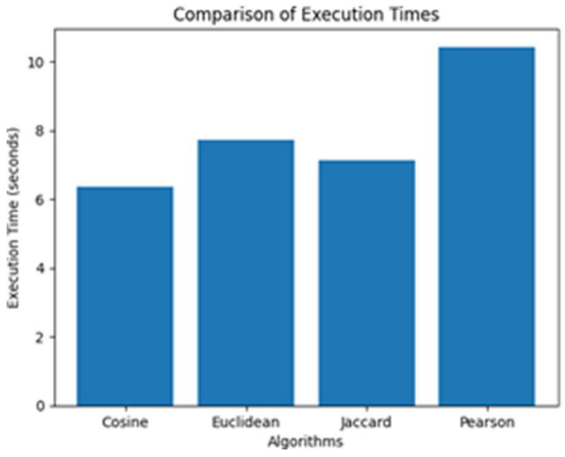

Fig.4.ComparisonofExecutionTimes

VIII. COMPARATIVEANALYSISOFDIFFERENTSIMILARITYMETRICS

Timecomplexityisameasureofhowtherunningtime of an algorithm or code snippet grows as the input size in- creases.Ithelpsinunderstandingtheefficiencyandscalability of algorithms. Comparing the time complexities of different

ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

algorithmsorcodesnippetsprovidesinsightsintotheirrelative performance.
In the comparison we performed, we measured the exe- cution times of different calculations: cosine similarity, Eu- clidean distance, Jaccard similarity, and Pearson coefficient correlation. By analyzing the execution times, we can infer their time complexities and compare their efficiency.

IX. CONCLUSION

We are providing the user with a rich UI with well-recommendedplaces.Wealsoprovidethedetailsoftheplaces to visit near the region. We provide them with the details of theregionsandgivethemthecomfortofstayinginthatregion. Theseovercometheproblemoftheexistingsystem&provide them with good recommendations of places, to stay places nearby. The whole planning of the trip is easily done from selecting a place to visit & different accommodation placesfor staying in that region. The proposed system will achieve the problem of multiple criteria recommendation systems & providing the details of the place & nearby places.

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ISSN:2153-182X, E-ISSN: 2153-1838
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ISSN:2153-182X, E-ISSN: 2153-1838
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