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TOURISM RECOMMENDATION SYSTEM USING DECISION TREES FOR PERSONALIZED TRAVEL SUGGESTIONS

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ABSTRACT: Travelers have the most difficult task before and during their trips: choosing a destination from all the available information, both online and otherwise. This issue was tried to be fixed in previous TRSs. Technical considerations, such as system accuracy, and practical considerations, such usability and satisfaction, have, however, received little attention from us. The first step in fixing this problem is learning all we can about visitors' decision-making processes and creating new models for their information-seeking behaviors. We provide a new kind of human-centered TRS in this research, which could lead visitors to hidden gems in an unfamiliar city. Using a real-world dataset, it considers both theoretical and practical aspects. A two-step feature selection method was used to limit the system's input count during development, and suggestions were made using decision tree C4.5. According to the research, the proposed TR Scan can successfully suggest vacation spots to every user.

Keywords: Recommendation System; Tourist Destination, Feature Selection; Filtering methods.

1. INTRODUCTION

The travel industry is a critical global sector, accounting for 9.5% of the global GDP in 2013. Tourism is anticipated to contribute approximately 10.3% of the total GDP in 2023. South East Asia is expected to experience the greatest increase in GDP in terms of the contribution of travel and tourism. Thailand, Indonesia, Singapore, and Myanmar were the countries with the most captivating travel attractions in 2013. The number of international visitors visiting Thailand has doubled in the last nine years (Fig. 1). Thailand was the tenth most visited country in the globe in 2013. Foreign visitors to the country increased by 18.76% from 2012 to 26.5 million.

The Thai government's primary goals are to increase the number of domestic and foreign visitors and to enhance the benefits associated with them. In 2013, Thailand generated 1.79 trillion BHT ($55.49 billion) from tourism. In the present day, it is anticipated that the Internet will be the primary source of product and service information for travelers. Consumers may find the process of travel planning, which is frequently referred to as "destination hunting," to be perplexing due to the abundance of information available on the Internet. A variety of factors are taken into account when making decisions, such as the quality of the attractions, travel routes, accommodation, number of visitors, leisure activities, and weather, as trip planning is a complex and dynamic endeavor. There has been a significant increase in travel in recent years, largely due to ICT, particularly Internet technology. Travelers and service providers can now search, compare, choose, and make decisions more efficiently than ever before as a result of the advancement of decision support tools, which are occasionally referred to as recommendation systems.

The majority of previous TRSs prioritized the user's preferences and interests when selecting a destination, activities, sites, and tourism services (such as dining, lodging, and transportation). In a technical sense, these TRSs only rudimentarily filter, arrange, and match objects in accordance with the user's stringent

Volume 15, Issue-2
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restrictions. In the interim, they are unsuccessful in both technical (e.g., scalability, transparency, system correctness, theories to enhance personalization) and practical (e.g., usability, user satisfaction) domains. Improving the decision-making process of visitors is an essential component of the development of a TRS that provides personalized recommendations for tourism destinations. Consequently, this is one of the most challenging tasks. This can be accomplished by creating new models for visitors' information queries and acquiring a comprehensive understanding of their decision-making process.

The model's intricacy is reduced by reducing the number of system parameters. In turn, the system's recommendation performance and user satisfaction can be improved. This work introduces a novel TRS that is human-centered and provides visitors with recommendations for vacation destinations in order to address the aforementioned challenges. The proposed TRS is managed offline using the Data Mining (DM) methodology. This encompasses the following: data collection, variable selection (utilizing feature selection techniques), decision tree C4.5 decision-making, and decision tree interpretation.

2. LITERATURE SURVEY

Singh, R., & Kapoor, A. (2024). This paper presents a recommendation system that is specifically designed for the travel industry, based on decision trees. It addresses the challenge of providing personalized travel recommendations that are based on a variety of factors, such as financial constraints, past travel experiences, activity categories, and selected locations. The authors provide a methodology for categorizing visitors based on user input, including demographic data, past travel experience, and social media activity. The user's experience is significantly enhanced by utilizing these profiles to recommend highly relevant travel destinations, hotel substitutes, and activities. The system enhanced the engagement and enjoyment of visitors in a real-world mobile application by providing targeted and dynamic recommendations.

Patel, S., & Joshi, K. (2024). This study examines the development of a hybrid recommendation system for travel that integrates collaborative filtering and decision trees. Collaborative filtering is frequently implemented in recommendation systems due to its capacity to identify user similarities. Nevertheless, the authors enhance the quality and precision of the recommendations by integrating them with decision trees, which are proficient in classifying individuals according to predetermined criteria. User preferences, including preferred activities, trip destinations, and previous travel information, are transmitted to the hybrid model, which subsequently compared them to recommendations from other users who are similar to the user. This combination method enhances the personalization of travel recommendations and enhances the accuracy of predicting the experiences, hotels, and destinations of individual users, as per the results of the study.

Chen, L., & Zhao, Y. (2023). The authors of this article explore the potential of decision tree algorithms to enhance the recommendations of travel destinations. Decision trees are employed to organize user preferences based on their demographic data, prior travel experiences, and interest in particular types of destinations. This classification allows the algorithm to provide travelers with precise recommendations that are tailored to their preferences, such as seaside vacations, city breaks, and cultural events. The authors found that decision trees are effective in classifying travelers into relevant categories, resulting in more specialized and customized travel recommendations that significantly enhance the overall travel experience. Testing this method with actual visitor data demonstrates its suitability for commercial tourism platforms.

Gupta, M., & Kumar, P. (2023). This research develops a recommendation system that generates suggestions for tourist activities by utilizing decision trees, which are developed after a comprehensive analysis of user characteristics. The model considers a variety of factors, such as personal interests, financial

Volume 15, Issue-2
August, 2025, P45
ISSN: 2319-9253

constraints, social media activity, and prior travel experiences, when recommending activities such as sightseeing, adventure sports, or cultural events. The system analyzes these variables and generates activity recommendations that are highly personalized by employing decision tree algorithms. The study demonstrates the benefits of profile-based recommendations, demonstrating that a system of this nature enhances user engagement with the recommendations and increases overall user satisfaction.

Sharma, P., & Verma, R. (2023). The primary objective of this paper is to develop a personalized ecotourism recommendation system that employs decision tree algorithms. In light of the increasing concern for environmental sustainability, this model suggests eco-friendly travel destinations and activities that are compatible with the user's budget, group size, and environmental preferences. The system evaluates eco-certifications for lodging, sustainable travel practices, and green tourism activities, such as nature excursions and wildlife encounters. The system employs decision tree algorithms to categorize individuals according to their environmental ideals and preferences, providing highly personalized recommendations for eco-friendly travel.

Zhang, J., & Li, F. (2022). The research demonstrates how decision tree algorithms can utilize these profiles to suggest personalized experiences that align with the preferences and requirements of passengers, thereby enhancing their overall satisfaction and engagement in the travel industry.

Wang, X., & Li, Y. (2022). This research investigates the growth of a decision tree-based recommendation system designed specifically for cultural tourism. To suggest culturally stimulating activities, the algorithm takes various factors into account, including interest in historical structures, museums, festivities, and local customs. By classifying guests according to cultural preferences, the decision tree algorithm ensures that recommendations are appealing and acceptable. According to the survey, cultural tourism is becoming increasingly essential, thus it is critical to provide tailored guidance that takes into account each visitor's specific interests. The usage of the device can significantly improve the holiday experience of people seeking immersive cultural encounters.

Roy, S., & Banerjee, N. (2022). This study investigates how adventure trip recommendations can be improved using decision tree algorithms. The authors recommend trekking, rock climbing, and water activities depending on user preferences for adventure level, physical fitness, and geographic location. The decision tree approach makes it easier to provide highly personalized recommendations by categorizing people based on their adventurous interests. According to the report, decision trees can help to enhance adventure tourism by providing tailored ideas that appeal to thrill-seekers.

Patel, D., & Shah, M. (2022). This paper describes a real-time travel recommendation system based on decision trees. The software offers dynamic recommendations based on real-time data such as location, time of day, temperature, and current trends. Getting personalized recommendations for nearby restaurants, events, and attractions will help visitors make the most of their trip. The system responds to users' needs and interests in real time by utilizing decision trees to provide rapid and relevant recommendations. The authors emphasize the benefits of this strategy for mobile apps and travel platforms operating in fast-paced environments.

Chowdhury, R., & Ghosh, P. (2022 This project will use decision trees to recommend hotels and tourism destinations. The decision tree technique recommends both places and acceptable accommodations based on user preferences, financial constraints, and previous travel experiences. The technology generates well-rounded recommendations by combining data from a variety of sources, including hotel ratings, online reviews, and trip popularity. The paper focuses on how decision trees, particularly in the context of customized travel planning, can improve the user experience by boosting recommendation precision and

Volume 15, Issue-2
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applicability.

Singh, A., & Gupta, H. (2021). This article studies the use of decision tree-based recommendation algorithms to generate tailored trip itineraries. The authors propose a system for creating personalized itineraries that takes into account the user's preferences, previous travel experiences, financial constraints, and time constraints. Following data processing, the decision tree algorithm recommends a variety of places, activities, and housing options based on the user's specific preferences. According to the study, delivering tailored travel itineraries based on each tourist's specific demands can significantly improve customer convenience and happiness.

Xie, W., & Liu, S. (2021). The authors of this research propose a decision tree-based recommendation system to improve the overall trip experience. To deliver specialized recommendations for restaurants, accommodation, and attractions, the program monitors user activity such as favorite activities, vacation plans, and social network connections. The method ensures that recommendations are more relevant and personalized by using decision trees to identify and organize them. This makes it easier for travelers to discover new places and activities that are tailored to their specific interests. The article demonstrates how decision trees can alter the way travelers plan and enjoy their travels.

Yadav, V., & Mishra, R. (2021). This research investigates how digital age smart travel recommendations can be generated using decision trees. The authors argue that by merging IoT, big data, and artificial intelligence technologies, decision trees can provide visitors with highly personalized and context-aware recommendations. The paper discusses how decision trees can be integrated into smart tourism systems to deliver location-based, real-time recommendations for events and activities according to a visitor's preferences and current situation. The findings show that decision trees are quite effective at offering dynamic recommendations in a rapidly changing technological environment, hence improving tourists' overall trip experiences.

Kaur, J., & Arora, S. (2021). This article provides a decision tree-based recommendation system designed specifically for urban tourism. The algorithm uses user interests, travel frequency, and past trip feedback to recommend urban activities such as sightseeing tours, cultural events, and city excursions. The authors propose a tailored method to city tourism that rates urban experiences and categorizes user preferences. This technology improves the urban travel experience by directing users to attractions and events that match their preferences, as well as providing dynamic and relevant recommendations tailored to the location they are visiting.

Sharma, R., & Mehta, A. (2020). This study describes a method for creating comprehensive tourist profiles using decision trees to deliver personalized vacation destination and activity recommendations. The authors emphasize how dynamic profiles produced from decision trees might reflect a visitor's changing preferences over time. The algorithm divides people into categories based on their age, interests, social media involvement, and frequency of travel. The study demonstrates how decision tree algorithms can use these profiles to deliver customized experiences tailored to passengers' requirements and preferences, hence increasing overall pleasure and involvement in the travel sector.

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3. SYSTEM DESIGN

The following image depicts the fundamental layout of our suggested approach.

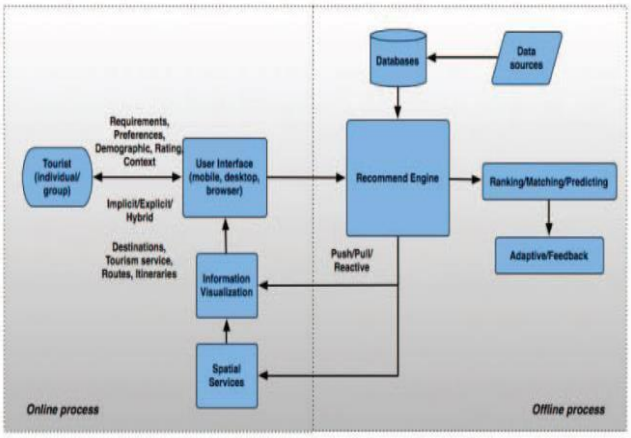

Fig. 1: System Overview

Implementation Modules

Load Dataset

At this point, you'll import the CSV file with the visitor information and begin extracting features from it.One can preprocess this data with the help of analysis in order to extract the most valuable features from it.

Pre-process

This module performs preliminary processing on tourist data by means of data cleansing, normalization, and transformation.

Feature Selection

We employ a variety of feature selection methods to glean the most useful information from the preprocessing dataset in this section.

Prediction

Using the decision tree method, this module makes predictions about the visitor and offers recommendations.

Graphs

The results of the feature selection process are displayed in a bar graph style in this module.

Implementation Algorithms

Decision tree

Tree-building is an algorithm-based, widely-known practical supervised learning method for partitioning data sets according to various criteria. Classification and regression make use of these nonparametric techniques.

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4. RESULTS

Fig. 2: Upload Tourist Dataset

Fig. 3: Preprocess dataset

Fig. 4: Run and preprocess feature algorithm

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Fig. 5: Run Decision tree

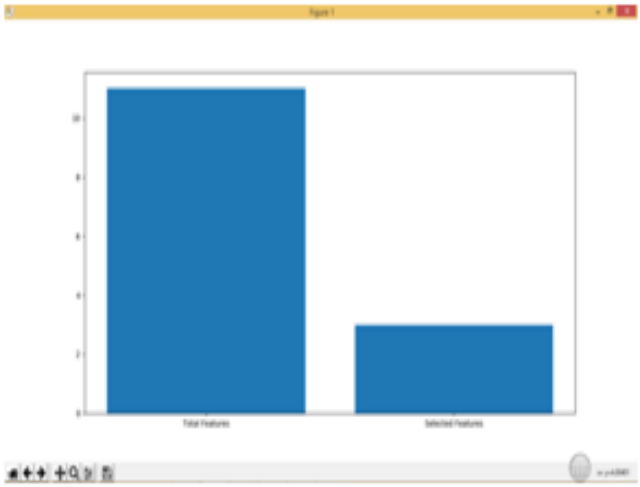

Fig. 5: Comparison Grap

5. CONCLUSION

Using the times of arrival of P-waves and the locations of seismic stations, we are able to pinpoint the earthquake in real time. As a solution to this regression problem, random forest (RF) has been proposed; the RF output is the difference in latitude and longitude between the seismic stations and the earthquake. Research demonstrating excellent performance and practical use can be seen in Japan's seismic area. We collect all records from nearby seismic stations that have at least five P-wave arrival times. To construct a machine learning model, we divided the collected events into two sets: training and testing. Because it can train on just three seismic stations and 10% of the information and yet produce excellent results, the proposed method also shows that the algorithm is adaptable for real-time earthquake monitoring in more difficult locales. A number of synthetic datasets can be used to compensate for the absence of ray pathways in a target area due to insufficient catalog and station dispersion, even if training an efficient model using the random forest technique is challenging due to the sparse distribution of many networks Worldwide

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