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TRS – A Rule Based Personalized Tourism Recommender System

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Abstract: ***In today's world many people rely on online services. They even plan for their trips by searching places online. However, they usually face problems of being supplied with lots of information. In consequence, they end up wasting a great amount of time in searching and decision making. Getting the expert advice to specify a reliable tourist attraction quickly and consistent to the requirements of each tourist was difficult, and the amount of experienced experts who can advise for tourism issues was insufficient. Providing an effective service in the tourism sector, such as using the technology of computer systems, can be the right solution and very necessary to attract foreign and local tourists to visit the tourist attractions in the country. Travel and Tourism domain is one of the most important economic areas of a nation and recommender systems in this domain would cater to not only the tourists but also to the governments. To save time and improve the tourist experience, the recommender system recommends to a tourist the most attractive places across the country according to their preferences. The application also allows the user to help book hotels. Along with displaying some of the famous attractions in that place.***
Keywords: Recommendation System, Tourism, Chatbot, Web application, Computer Technology

I. INTRODUCTION

Tourism is one of numerous commercial enterprises that has profited massively from utilizing the site as a part of the web. The growth rate in online tourism has quickly increased. This is because it makes it easier for travellers to travel anywhere with information about the places. Tourism industries have faced a hard challenge since the coronavirus disease 2019 (COVID-19) pandemic. As the tourism industry gets an opportunity to rebound, it is necessary to prepare adequate strategies and activities to be able to provide good service for every tourist and all stakeholders. Traditionally, travellers used to rely on travel magazines, personal travel blogs, or a combination of online resources and services such as travel guide, map services and human intelligence to piece together an itinerary. This is because the traveller generally doesn't have any prior knowledge and they may face the problem of difficulty and time consuming in travel planning, especially first-time travellers. So, to provide that information, our web-based recommendation system proposes the places of interest for the travellers. It is based on a rule-based Tourism Recommender System. The main function of this system is to recommend the places based on the input from the user. Users will also be able to book hotels via our system. In the tourism sector, new technologies based on the Internet currently play a very important role, as they can supply more complex and complete products that meet users' demands. But before presenting any suggestion to the user (hotels to stay, places to visit, cultural or leisure activities to perform, etc.), the system will have to explore several sources of information. It is imperative to take on the problem of locating, processing, and integrating all the necessary and available information in order to manage and organise the available information of the expanding and decentralised database that the Internet has become. The tourism sector has emerged as a potential source of economic growth. Many attractions are detected on several platforms. Machine learning and data mining are some potential technologies to improve the service of tourism by providing recommendations for a specific attraction for tourists according to their inputs of location and profile. Digital tourism is a part of digital transformation in the tourism industry that uses digital technology as a strategic platform for transformation from the traditional approach to digital. The digital platform offers a better solution for tourism rather than the traditional approach through a more effective and efficient service for stakeholders in tourism. Chatbot interacts with the user and finds their interests. A chatbot is a basic computer software that uses artificial intelligence to mimic human conversation. It uses AI to simulate conversation with users through messaging chats or voice commands. These bots are used in many service areas as an information provider in online mode. By utilising pre-programmed responses to user inquiries as well as increasing responsiveness, Natural Language Processing advanced chatbots. The world is moving towards the automation of human effort with the help of machine learning, artificial intelligence, and robotics. While there is a huge scope of improvement, some of the key areas that can be targeted for automation are the responder system in various fields. An artificial intelligence-based bot can replace human efforts without compromising on the quality of response.

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II. LITERATURE SURVEY

In previous Tourism System websites, we can observe that only some of the existing systems provide services that go beyond a pure booking system's functionality. Tourists can usually find tourism information on various blogs, forums, websites of points of interest etc. However, information overflow can occur on the internet as there is still a lack of focus on the use of recommended technology in the tourism field. During a trip, tourists need to be able to obtain tour information in a timely manner whenever there are any changes in their planned trip.

Nowadays, most of the people rely on various online services to plan a trip. However, they are generally faced with the problem of being supplied with a lot of information. In consequence, they have to invest a lot of time to decide what to visit, when, etc. This huge number of possibilities available on the internet makes it difficult for users to discern the more interesting offers from the rest. As a result, more appealing offers may go unnoticed. Recommender systems provide users with personalised information in an effort to enhance the tourist experience. In other words, the system chooses the offers that are more appropriate and suitable for users and provides activities tailored to their profiles.

For the recommendation system to be successful, it must be able to provide tourism information based on the user's preferences and current location. Recommendation of tour information is essential for users. There is also increasing demand for more information on local area attractions, such as local food, shopping spots, places of interest and so on during the tour. The goal of this system is to propose a suitable recommendation method for use in a Recommendation System Based on Tourist Attraction to provide personalized tourism information to its users.

III.PROPOSED SYSTEM

A. Recommendation based on scaled weighted average and popularity score

$$WeightedRating(\mathbf{WR}) = \left(\frac{\mathbf{v}}{\mathbf{v}+\mathbf{m}} \cdot \mathbf{R}\right) + \left(\frac{\mathbf{m}}{\mathbf{v}+\mathbf{m}} \cdot \mathbf{C}\right)$$

Fig. 1 Weighted Rating Formula

A recommender system, or a recommendation system, is a subclass of information filtering system that seeks to predict the “rating” or “preference” a user would give to an item. More formally, the recommender problem can be interpreted as determining the mapping (c, i) → R where c denotes a user, i denotes an item, and R is the utility of the user being recommended with the item. Items are then sorted by utility and top N items are presented to the user as a recommendation.

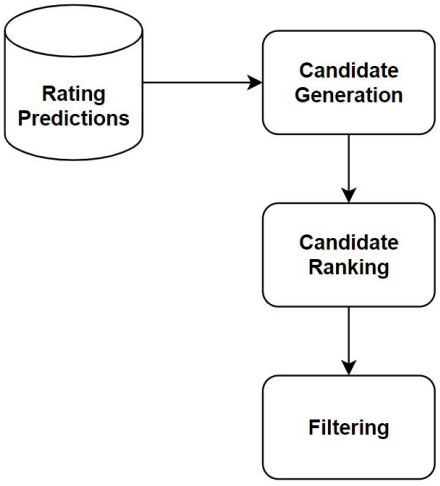


Fig. 2 Ranking based results

Ranking algorithms rely on search queries provided by users, who know what they are looking for. Recommender systems, on the other hand, without any explicit inputs from users, aim to discover things they might not have found otherwise.

Recommender systems put more emphasis on personalization, and hence, are more exposed to data sparsity. Many recommender system predictions tend to focus on predicting the ratings as good, or bad that a user gives to the items which they haven't seen yet. However, that's different from what a recommender system needs to do in the real world. People typically don't care how accurately you predict their prices for new items. The ratings that recommender systems offer are the total ratings their prior users have given, not a forecast of your rating.

B. Working of the Recommendation System

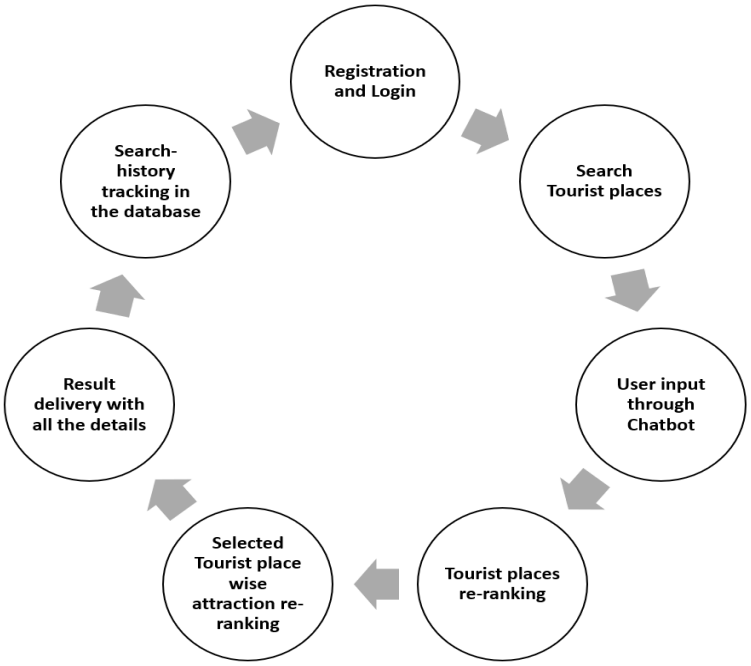


Fig. 3 Working of Recommendation system

In figure 3, the working of our study is defined such that it includes the steps of the registration/login process of the user which is required to recommend the place according to user profile. The user also can find the places according to city wise, and the ranking of those tourist places. Also, the system gives the nearest attractions suggestions that can also help to re-rank from the user experience. Search history is saved in the database for future suggestions. All this information is provided with all the details of places and attractions around it.

C. Methodology

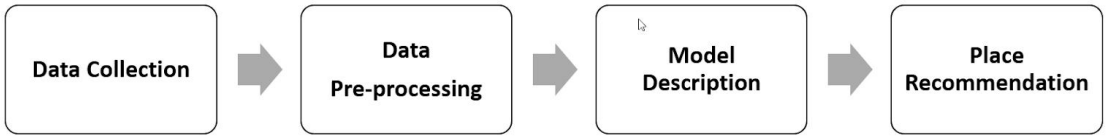


Fig. 4 Methodology

1) *Data Collection*: The real-life data that includes structured data such as Place name, City where it is located, rating of users, and unstructured data such as review of users. The data set excludes the user's personal details such as name, ID, and location so as to preserve their privacy.
2) *Pre-processing*: The collected data are pre-processed for the availability of missing values in most of the structured data. Hence, it is essential to fill out the missed data or remove or modify them to enhance the quality of the data set. The pre-processing step also eliminates the commas, punctuations, and white spaces.

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3) *Model Description*: As described above the recommendations are the results of a rule-based ranking and recommendation system. Using various APIs, we generate additional parameters to our data such as Geographic coordinates: Latitude, Longitude, Availability of Medical facilities, Temperature, Humidity, AQI score.
4) *Places Recommendations*: Based on user's parameters (which may include distance, no of days, age of traveller's inclusion of infants and senior citizens) and the rules of the Rule based system, data is manipulated, and weighted scores are generated using the weighted score rating function, which are then used to rank the place and the ones with the top score are recommended to users.

IV. DESIGN AND IMPLEMENTATION

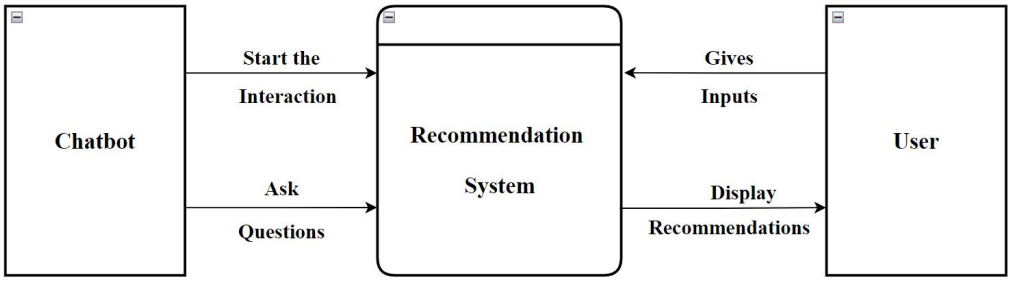


Fig. 5 Data Flow Diagram (Level 0)

In the first step the user has to register/sign in using a valid email and password. After Login, the user will have an option to search directly for a particular place or call a chatbot. After calling the chatbot the user will be welcomed by the chatbot, which will ask the user a few questions for personalized recommendation. After the user answers the given question, the chatbot passes a query to the data evaluation model, which in turn will use the database to recommend results to the user. Later, the system will generate the output by tracking the user input and generate patterns according to the places the user has visited later. After this operation, the user may logout.

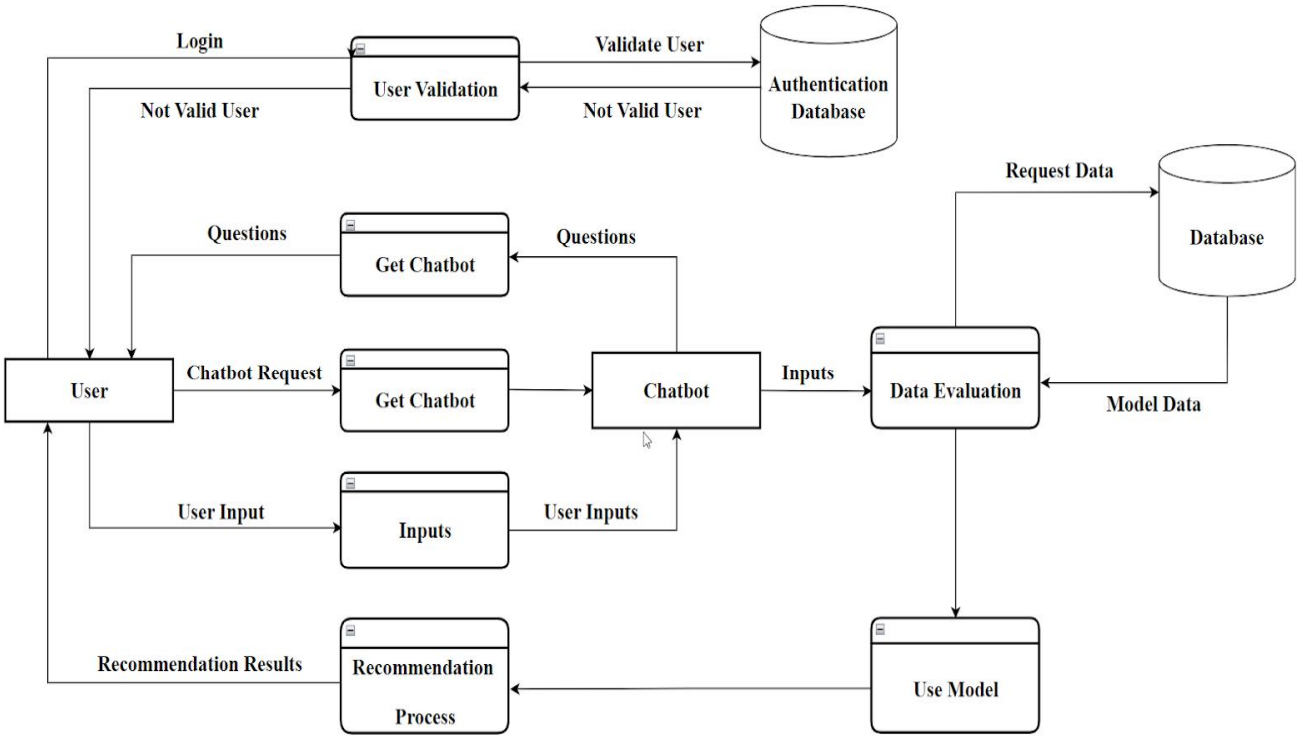


Fig. 6 Data Flow Diagram (Level 2)

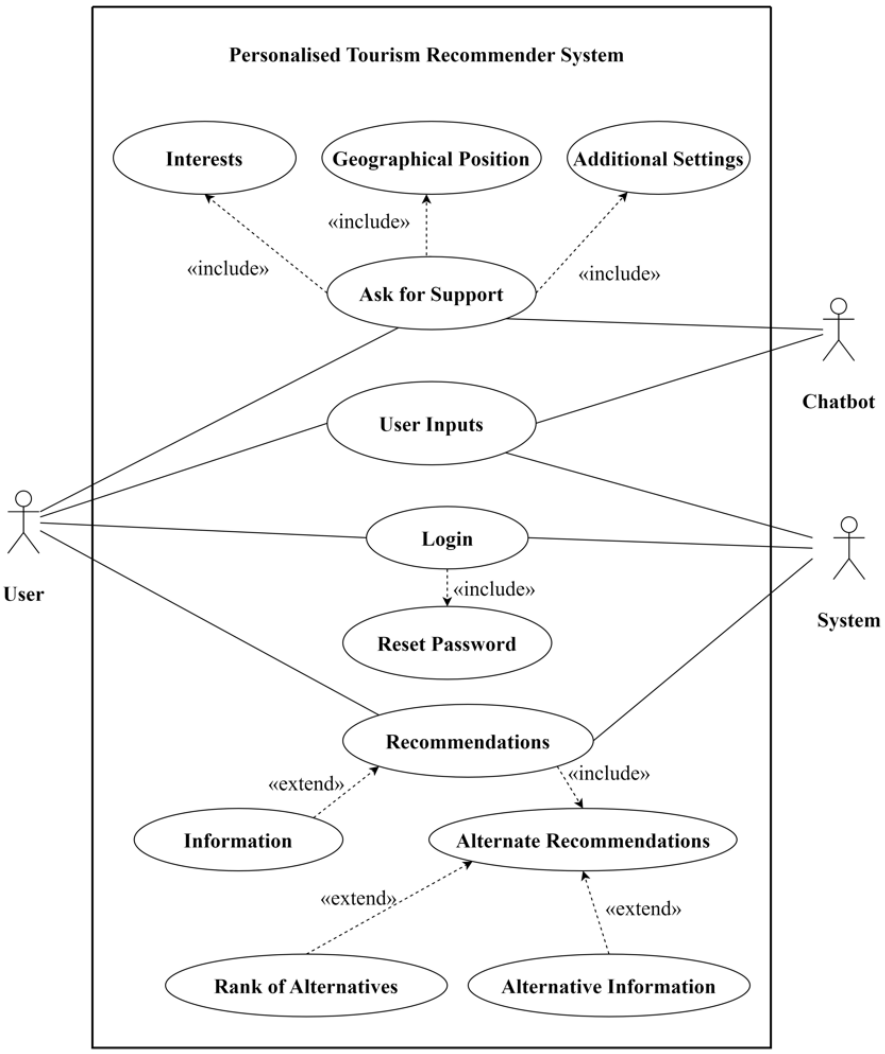


Fig. 7 Use Case Diagram

V. CONCLUSIONS

The project's aim was to provide tailor-made travel plans for users based on their travel details and preferences. The aim of the project was successfully accomplished by exploiting various Data Science tools and techniques and the recommendations were provided to the user. The scope of the project is really wide and hence there is a lot of room for improvement and future work. In future this application can be expanded to provide more accurate results by providing recommendations based on additional factors such as climate or time of the day. After going through the surveying, it can be gathered that there is a huge scope of application development in the mobile domain. Following the same notion, we can also develop applications that can tackle issues such as Integration with social media, Transport recommendations, Budget Wise Recommendation, Hotel recommendations based on budget, Local Emergency Services, etc.

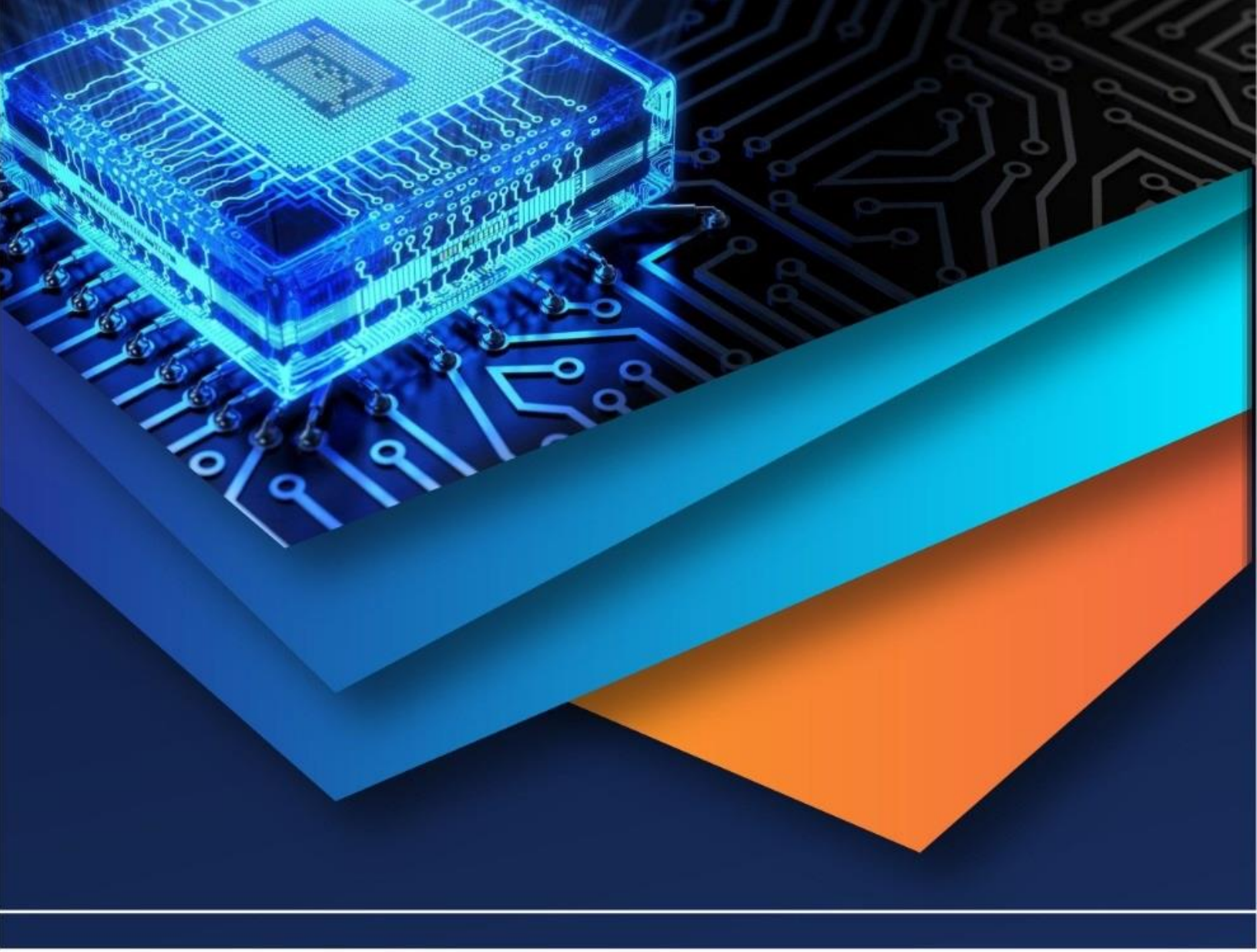
VI. ACKNOWLEDGMENT

On the successful completion of this project, we would like to show our gratitude towards everyone who assisted us in the development of this project. We are thankful to the developers whose work on websites and programmes that has directly or indirectly inspired us to construct a platform which can efficiently recommend the users with places, to make a clear decision on their tour destination. We hope that our efforts for TRS System will be successful, and it will become a powerful decision-making tool to help users finalize their tour.

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