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NomadSense: A Smart AI-Based Travel Information and Itinerary Generation System for India

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Abstract : In modern world, technology has inevitable part of human life. Today, almost everyone uses mobile apps or websites. Rapid technological advancements have heavily influenced almost every field. Tourism industry is no exception. Tourism industry plays a major role in country's economic development. Many countries earn a major portion of their revenue through tourism sector. This research paper contains literature review of nine different research papers published by IEEE (Institute of Electrical and Electronics Engineers), a global professional organisation that focuses on advancing technology. This research paper also includes our proposed solution, Nomadsense. As the use of technology has increased rapidly in tourism sector, people use different websites/app to plan their trip to new places. The user has to switch to different tabs/apps while planning their trip. This scattered data leads to frustration and confusion in user while planning their trip. We have taken it as our main problem statement for our solution. Nomadsense is a single centralised platform where all travel related information is available together. It also has different components like plan trip, AI chatbot etc. The system processes input given by user and generates response. The app improves users experience as compared to traditional systems.

IndexTerms **- Smart Tourism, Recommender System, Chatbot, Route Planning, AI in Tourism, Itinerary Generation, Mobile Application**

I. INTRODUCTION

The tourism industry has significantly contributed to economic growth in various countries, especially before the COVID-19 pandemic [1]. A large part of this economic growth in many countries comes from the tourism sector [2]. The arrivals growth rate of international visitors was reported by UNWTO to be around 4% in 2019, accounting for approximately 60 million arrivals [1]. In the post-pandemic era of COVID-19, the tourism industry has started to rebound as predicted in a previous study [3]. Various strategies aimed at improving service quality for tourists are being pursued to enable the tourism industry to produce a positive impact on regions. As an effort to improve the quality of service, this can be provided by improving the tourist experience by utilizing smart technology [4].At the same time, rapid digitalization has changed the way people plan and experience travel. With the rise of mobile apps, online platforms, and social media, a huge amount of tourism-related data is generated every day [5], [7]. This data creates new opportunities for developing intelligent tourism systems, but also brings challenges in how to effectively use it. As a result, research in this area now focuses on personalized travel planning, group recommendation systems, user profiling based on social data, knowledge representation, and real-time opinion analysis [6], [8], [9]. One important area is personalized travel route planning. Earlier methods mainly focused on finding the shortest path, often ignoring what tourists actually prefer [5]. To address this, Zhang et al. [5] proposed a method that considers multiple factors such as time, budget, ratings, and popularity. Their results show that considering

these factors leads to better travel plans compared to traditional approaches [1]. Another challenge comes from group travel, where different people have different preferences. Kim et al. [6] developed a system called GRec_Tr that combines collaborative filtering with constraint-based methods. Instead of focusing only on majority preference, it tries to reduce overall dissatisfaction in the group, which improves user satisfaction [6]. Social media data also plays an important role in understanding user behavior. Kesorn et al. [7] used Facebook check-in data to create user profiles and provide better recommendations. Their system adapts to user interests over time and considers factors like season and social connections, leading to more accurate results [7].To support these systems, structured data representation is necessary. Chessa et al. [8] developed a Tourism Knowledge Graph by combining data from different sources like Booking.com, Airbnb, DBpedia, and GeoNames. This helps in better data integration and supports advanced applications such as recommendation systems and sentiment analysis [8].In addition, monitoring public opinion in real time has become important, especially during emergencies. Meng and Chen [9] used a lightweight BERT model to analyze tourism-related data from social media and news. Their model performs sentiment and topic analysis efficiently, making it useful for real-time monitoring [9].Overall, these studies show that tourism systems are becoming more intelligent and data-driven, covering areas like route planning [5], group recommendations [6], user profiling [7], knowledge graphs [8], and opinion monitoring [9]. However, there is still a need to combine these approaches into a single, effective system. This study aims to address that gap by developing a more integrated smart tourism solution..

II. Type Style and Fonts

[1] Sustainable Tourism Industry Development: A Collaborative Model of Open Innovation, Stakeholders, and Support System Facilities

The research carried out by Fandi Achmad, Yudha Prambudia, and Augustina Aish Rumanti explores the idea of building a sustainable tourism sector. Instead of looking at sustainability from just one angle, the authors approach it in a more balanced way by combining three important aspects: open innovation, participation of different stakeholders, and the availability of proper support systems. According to the study, improving the overall performance of the tourism industry is key to achieving long-term sustainability. The authors make it clear that sustainability is not limited to environmental protection alone. It also includes economic development and the welfare of people who are directly or indirectly connected to tourism activities. This wider viewpoint helps in understanding tourism as a complete system rather than an isolated sector.

The study strongly supports the idea of collaboration. It highlights the need for joint efforts between government bodies and Small and Medium Enterprises (SMEs), as both have a significant influence ontourism growth. To examine this, the researchers adopted a quantitative method. They gathered data from around 358 SMEs located in tourist regions through a questionnaire-based survey. For analyzing the collected data, they used Partial Least Squares Structural Equation Modeling (PLS-SEM), which helped them study how different factors such as innovation, stakeholder involvement, and support systems affect tourism performance.

The framework proposed in the study shows that cooperation among various groups—including government authorities, local communities, and private businesses—is essential for improving tourism outcomes. It also brings attention to the importance of support systems like infrastructure, technology, and skill development in strengthening the industry. Another important aspect discussed is open innovation, which allows organizations to adjust to changing conditions and come up with new ideas, making the tourism sector more adaptable and sustainable. One of the key strengths of this research is that it presents a comprehensive approach by combining multiple factors into a single framework. This makes it more practical for addressing real-world challenges. Additionally, the study is backed by data, which supports the claim that these elements have a positive impact on tourism performance.

However, there are some limitations. The study mainly focuses on concepts and policy-level understanding rather than real-world implementation. It does not explore user-focused solutions or systems that interact directly with tourists in real time. Moreover, modern technologies such as AI-based recommendation tools or chatbots are not included in the model.

In conclusion, while the research provides a strong theoretical base for sustainable tourism development, it lacks practical application. This creates an opportunity for solutions like NomadSense, which can bridge this gap by combining sustainability principles with advanced technologies to deliver a more user-centered experience.

[2] Smart Tourism Recommender System Modeling Based on Hybrid Technique and Content Boosted Collaborative Filtering

The study mentioned in this research paper was done by Choirul Huda , Yaya Heryadi, Lukas, and Widodo Budiharto. This research paper was published by IEEE (Institute of Electrical and Electronics Engineers). In this research paper authors suggest having smart tourism recommender system, which will give smart places recommendation to the users.

The Smart tourism recommender system suggested by authors of the research paper is based on hybrid model. It uses filtering technique to filter out places to suggest to tourist to visit. This system improves users satisfaction and experience.

The Smart tourism recommender system uses hybrid techniques which basically combines two types of filtering technique which are content- based filtering technique and collaborative filtering technique. To make the suggestion given by recommender system more user satisfactory, the results obtained from the hybrid technique can be combined with other filtering techniques like demographic-filtering (DF), aspect-based sentiment analysis etc.

In content-based filtering technique, the filtering is done based on the content of the user like their search history, the places they visited in the past, the places users showed interest in etc. This basically involves generating recommendation on the basis of user's own activity and preferences like the destinations which user's liked or saved or the types of the destinations which users explored more in depth. After the user has used this system for a long time, the recommendations will improve a lot. The suggestion will not remain only to travel or tourism but suggestions will be improved by suggesting location-type, time of the year to visit and also the season the traveller should visit. So, if someone likes places which are less crowded, the system will suggest places with similar atmosphere and vibe. The places which are popular tourist spot and are usually crowded will not be suggested.

Main advantage of the content-based filtering techniques is that it gives personalised recommendations to the tourists which will improve their satisfaction level. Drawback of this filtering technique is that it will keep on suggesting similar places to the users and will not be able to suggest new destinations to explore. At some point, user might get fed-up with similar recommendations reducing user satisfaction.

The next filtering used in the hybrid technique is collaborative filtering. In this collaborative filtering, the recommendations are given to the users based on the data of another user. The data are collected are two different users and a similarity score is generated based on the content of the users i.e. their preferences, search history etc. The similarity score shows how those two users align with each other in terms of their travel interests. For example, if two users and both of them have shown interest in popular cultural places, the system considers them similar. The users are recommended destinations which the other user visited or liked if the similarity score between those two users is high. This filtering is highly based on the behaviour of 'like-minded' users.

Main advantage of the collaborative filtering is that the places suggested by the recommender system to the user will highly align with the user's interests. It will overcome the drawback of the content-based filtering which is that no new destinations is recommended to the user. The collaborative- filtering can suggest new places to the user, which the other user with high similarity score with the user explored.

Major advantage of using this hybrid technique for travel recommendation system is that highly personalised suggestions for travel destination can be given to the user. This increases user satisfaction and experience. The system doesn't give same destination suggestion to every user, instead the suggestion is personalised highly according to the users own preferences and travel interests.

Drawback of this hybrid technique is that this system is highly dependent on the user's data which increases the data privacy risk. While implementation of this technique we face a major problem called as cold start problem.

The main problem that will be faced while implementing this smart tourism recommender system using hybrid technique is the cold start problem. As the name suggest we face this cold start problem during the starting phase of the implementation of this hybrid technique. Both the filtering methods used on the hybrid technique is heavily dependent on the user's data. When a new user is created, the system will not be able to give personalised recommendation to the user in the start. Only after user has used this system for a while the system will be able to generate good suggestions of destinations which will align with the user's personal interest. Also, the suggestions given by the system will depend on the number of users using the system. If only small number of users who share similar travel interest uses the system, the recommendation given by the system will not be up to the user's expectation level, which can significantly affect user's satisfaction.

In conclusion, the smart recommender system using hybrid technique and content-boosted collaborative filtering gives highly personalised recommendation to the user. This system will work extremely well if the cold start problem is tackled successfully and a large number of users uses the system.

[3] A Systematic Review of Chatbots: Classification, Development, and Their Impact on Tourism

In this paper Benaddi et al. [3] and other authors of this research paper, studied how chatbots are important in the tourism domain. This paper gives details about chatbots and how they have developed over time. They divided chatbots into two stages: first age, -rule-based chatbots, which only used to reply to certain keywords. While the second age chatbots were AI-based, which uses Artificial Intelligence (AI), Machine learning(ML) and Natural language processing(NLP). It gives more human like responses. This change was important in the tourism industry as users asks different kind of questions so a basic chatbot was not enough.

The Author also classified on the basis of architecture, functionality, and where they are used. This part of paper shows not all chatbots work in same way. Some are simple while some are more intelligent. Along with this paper also explains that some chatbots are designed mainly for text- based interaction, while others may also support voice communication. In tourism both forms are usefull For example, a text chatbot may be enough for booking tickets, but a voice-based chatbot could be more helpful for a traveler who is driving or for a visually impaired person.

One of the best advantage of chatbots in this study is it gives quick responses, are easy to use and improves customers interaction. In tourism this is so important as users often need immediate help. For example if someone needs to check for near by hotels at night or if someone urgently needs medicine at night he/she can ask chatbot and it will give instant support without any human agent. Because of this, chatbots are commonly used in hotel booking, travel guidance, and customer support services.

However, the paper also points out chatbots have some limitations. Many chatbots cannot properly understand context and they often fail when the query becomes complex. For example if the user asks multiple things all together, the chatbot may not give a proper answer. The study also says many chatbots have limited domain knowledge and so they cannot continue long conversations. One more issue is that many chatbot systems still lack multilingual support. In tourism, this is a big problem as travellers may come from different language backgrounds.

Overall, the study gives good understanding of chatbots and its role in tourism. It also explains both advantages and limitations clearly. This paper does not suggest any chatbot designed especially for tourism. The author only studied the existing paper. It is more of a review paper than a practical implementation. Because of this, there is scope for systems like NomadSense, which combines AI chatbot features with travel planning and multilingual support in a more practical way.

[4] Emotion Recognition and Management in the Tourism Industry Using Improved CNN

Qi and Han [4] talk about how we can improve tourists' experience by understanding their emotions, especially during emergency situations. In their study, they use a technology called CNN (Convolutional Neural Network) They also use a 3D CNN with an attention mechanism to make emotion detection more accurate

The system has different types of data like facial expressions and body movements It can identify emotions like happiness anger and anxiety which helps in understanding how a tourist is feeling and can be useful to give proper help during difficult situations One good thing about this system is that it can understand complex emotions better because it uses deep learning which is more advanced than older methods But there are some limitations he study mainly focuses only on emergency situations and does not help in normal travelling

In conclusion, this research helps in improving safety and understanding tourists' emotions, but it is not connected with full travel systems. NomadSense solves this problem by giving simple safety tips and guidance, without using complicated emotion detection technology.

[5] A Tourism Route-Planning Approach Based on Comprehensive Attractiveness

This research paper is written by Linjie Jiao , Zhijie Yu , Zheng Lin , and Mengjiao Gan. In this the authors has explained a smart way to plan travel routes by considering many important factors These include travel cost distance between places time limits and how popular the tourist spots are To make the planning better they also created something called as an attractiveness index which helps in ranking and choosing the best travel routes for the travellers

The author has said in this paper that he has uses real-world data and applies a genetic algorithm to find the most easy routes This method works by trying different possible routes and then selecting the best one based on given conditions Because of this the final routes are more practical and match what the user actually needs this helps travellers to travel very easily

One of the biggest advantages of this system is that it pays attention at multiple factors at the same time This makes the travel plan more realistic and useful for travellers It also helps users to get better routes according to their desired preferences which can improve their overall travel experience and satisfaction of traveller

However there are some drawbacks in this research which is written by Zhang et al The system does not use real-time data so it cannot adjust if there are sudden changes like traffic or weather It also does not consider changing user preferences over time second limitation is that it does not include features like recommendation systems or chatbots which are very useful in modern applications Also the system is more focused on algorithms and does not provide a simple or user-friendly mobile interface

In conclusion this research gives a strong idea for route planning and optimization but it is not a complete travel solution NomadSense improves this by combining route planning with AIbased suggestions and interactive features, making it more useful and easy for users.

[6]A Group Travel Recommender System Based on Group Approximate Constraint Satisfaction

In this paper J.K. Kim et al [6] focuses on one of the common problems in tourism recommendation systems that is, planning trips for a group instead of a asingle person. In normal travel planning online platforms give so many options for destinations, hotels, flights, and activities. But when multiple people are travelling altogether choosing the best option becomes more difficult because each group member may have different interests, budget limits, and travel preferences. The authors try to solve this issue by designing a group travel recommender system that can suggest complete travel packages while considering the choices of different members in the group.

Generally recommender systems are mainly made for individual users. These systems usually use methods like Content-Based Filtering, Collaborative Filtering, and Hybrid Filtering. Content-based filtering recommends items based on what the user liked before. It works well in some cases, but if the system does not select the right features, then the recommendation may not be very accurate. Collaborative filtering recommends items by comparing one user with other similar users. This method is very common and useful, but it also has some problems like the issues when there is not enough user data and when too many users or items are added. Hybrid filtering is a combination of both methods and is used to improve the recommendation quality by reducing the weaknesses of individual methods.

In the travel field, many researchers have already worked on recommender systems. Some studies focused on recommending destinations, some on hotels, and some on flights or full travel packages.However most of them are still designed for single traveler. That means they work well when only one person is planning the trip, but they are not always suitable when a group is involved.

Group travel is more complex than individual travel because every group member may have different interests and different limits.for example, one person wants a luxury hotel but another want to save money for sightseeing rather than spending more on hotel. Many existing group recommendation methods try to solve this by combining the preferences of all members and then giving a final group recommendation. Some systems create a group profile, while others first generate individual recommendations and then combine them. Researchers have used collaborative filtering, genetic algorithms, deep learning, and other techniques for group recommendation. These methods are useful, but most of them are better for recommending a single item. In travel planning, the system has to recommend multiple things together, such as destination, flight, hotel, and activities. Because of this, normal group recommendation methods are not fully enough for this problem.

One of the main ideas used in this paper is the Constraint Satisfaction Problem (CSP). In simple words, CSP is a method where the system tries to find a solution that satisfies a set of. In travel planning these constraints can be budget, hotel type, transport preference or activity choice. The problem with normal CSP is that it expects all constraints to be fully satisfied. In real life, especially in group travel, this is not always possible. Not every group member can get exactly what they want. To handle this, the paper uses Approximate Constraint Satisfaction Problem (ACSP). This is a more flexible approach. Instead of checking only whether a condition is satisfied or not, it checks how much it is satisfied. This is more practical because small changes can still be acceptable. For example, if the hotel price is slightly above the preferred budget,

some travelers may still accept it. The paper also uses the concept of an indifference interval, which means a small difference from the original preference is still okay if it stays within an acceptable range.

The authors proposed a system called GRec_Tr. This system combines collaborative filtering and approximate constraint satisfaction to recommend travel packages for groups. The system works in three main phases.. First it looks at what kind of destinations other similar groups have liked before and makes a list from that. Then in the next step it takes what each person in the group wants and turns those into conditions like budget should be this much or hotel should be of this type. All these individual conditions are then combined to filter out travel packages that dont fit. The third step is something we found quite interesting. It checks if any one person in the group is getting a very bad deal from the suggested package. If someone is too unhappy with it that package gets removed. This is actually a smart move because usually in group decisions the majority opinion wins and one or two people just have to adjust. This system tries to avoid that situation which makes it more fair for everyone.

This paper is useful because it extends recommender systems from individual item recommendation to group travel package recommendation. It also combines collaborative filtering with approximate constraint satisfaction, which makes the recommendation process more flexible. The system can be helpful for travel websites and online travel agencies. It can save users' time ,reduce confusion during trip planning, and improve the quality of recommendations for group travel.

The paper also has some limitations. The dataset used in the study is not very large, so it may not fully represent all kinds of travellers. The system may not work as effectively for new users or newly added destinations because there is less available data. Another issue is that the system asks users to manually enter their preferences and how much variation they can accept, which might be a bit difficult in real applications. In the future, the system can be improved by automatically learning preferences from previous travel history, search patterns, or booking data. It can also be expanded by adding personalised group level recommendations for tourist places.

Overall, this paper gives a practical solution for a real problem in tourism recommender systems. Many earlier systems focused more on individual travelers or simple group recommendations. But group travel planning is more difficult because it includes many decisions and many people's preferences at the same time. The proposed GRec_Tr system tries to solve this by combining collaborative filtering with approximate constraint satisfaction. Because of this, it can recommend travel packages in a more balanced way and reduce dissatisfaction among group members.

[7] Personalized Attraction Recommendation System for Tourists Through Check-In Data

Kesorn et al [7] discuss recommendation systems in the tourism domain. Planning a trip sounds exciting but once you actually start searching, it quickly turns into scrolling through endless options. At some point, it becomes confusing and difficult to decide anything. Earlier recommendation systems were not built for this kind of situation. They were mostly applied to areas like movies or online shopping where user preferences are easier to define, honestly and more stable.

In those systems, user data is usually collected either by asking users directly or by tracking what they do online. But in tourism people don't always want to sit and answer questions about their preferences. And even if they want to do those preferences will not remain same over time. Someone might like adventure trips one year and then next year they may prefer something more relaxed. So the system ends up working with incomplete or outdated data.

Because of this, the authors started looking at social media as a possible solution. At first, it seems like a smart idea. People post a lot of information online, like photos, captions, likes, and tags. But when you actually try to use that data, it's not that usefull. For example, a person might post a picture of a beach with a caption like "best day ever," but that doesn't really tell us anything specific about their travel interests. Even tags and bookmarks often reflect general trends rather than individual preferences. They show what people are talking about not necessarily what they truly prefer.

This is why check-in data becomes more important in their work. Unlike posts or captions, check-ins show real actions. If someone has checked in at multiple historical places, it gives a clearer idea of what they prefer. This paper focuses on this idea and suggests that check-in data gives a more clear picture of user behaviour, since it reflects where people actually go rather than what they simply say online. In this paper, the authors have combined this data with collaborative filtering and analysed friend networks. The assumption here is that people who are socially connected or behave similarly might share similar interests.

One major issue of this is the cold-start problem, where the system has little or no data about a new user. In such cases, it struggles to make useful recommendations. One solution is to use data from the user's

friends, which Kesorn et al. also propose. It sounds practical because friends often influence travel decisions. But at the same time, not all friends have the same taste. If too much friend data is used it can actually confuse the system instead of helping it.

Different recommendation techniques have also been studied over time. Content-based filtering focuses on matching user preferences with item features, but it doesn't work well when there is not enough user data. Collaborative filtering uses data from other users, but it depends on having enough interactions to find similarities. Hybrid methods try to combine both approaches, and they generally perform better. But still many systems assume that user preferences stay the same over time.

Kesorn et al. address this by considering the idea that user interests changes over time. Someone who once preferred adventure might later look for quieter destinations, or vice versa. Newer systems try to adjust to these changes by updating user profiles over time and considering things like time or season. This helps improve recommendations, but it doesn't always work perfectly.

Overall, the research in this area has improved a lot, but there are still some gaps. The main challenge is not just collecting more data, but understanding which data actually represents real user preferences. By focusing on check-in data and social relationships, Kesorn et al. move in a more practical direction. Still it feels like there is still scope for improvement, especially in making systems that understand how people actually think and make decisions while travelling.

[8] Data-Driven Methodology for Knowledge Graph Generation Within the Tourism Domain

This research paper by Chessa et al.[8] talks about a problem that we all face when we plan trips. Today, people use many apps and websites like Booking.com and Airbnb to find hotels, read reviews, and choose places to visit. These websites give a lot of information, but the problem is that all the information is not connected properly. It is spread in different places, and sometimes it becomes confusing. For example, one website shows hotel details, another shows reviews, and another shows location. Because of this, it is not easy to understand everything together. So, even though there is a lot of data, it is not used in the best way.

To solve this problem, the paper introduces something called a Tourism Knowledge Graph. In simple words, a knowledge graph is like a smart map of information where everything is connected. Instead of keeping data separate, it links things together. For example, a hotel is connected to its location, its reviews, its facilities like WiFi or parking, and nearby tourist places. So when all this data is connected, the system can understand it better and give smarter results. Like, it can suggest better hotels or help users choose good destinations easily.

To make this system work, the authors created something called Tourism Analytics Ontology (TAO). This may sound difficult, but actually it is simple. It is like a rulebook that tells how to organize the data. It clearly defines different things like hotels, rooms, amenities, tourist places, and reviews. One good thing about TAO is that it separates a hotel building from the rooms inside it. Earlier systems did not do this properly, so it created confusion. Because of this new structure, the data becomes more clear and easy to use.

The paper also explains how they built this system step by step. First, they decide what they want the system to do, like reading reviews or helping users choose places. Then they collect data from different sources like Booking.com, Airbnb, DBpedia, and GeoNames. After collecting the data, they clean it because real data is usually messy. Sometimes there are mistakes, missing values, or extra information. So they fix all that. Then they change the data into a special format called triples, where information is stored like small sentences. For example, "Hotel is in London" or "User reviews hotel." After that, they connect all the data and create the knowledge graph. Finally, they check if the system is working properly.

One interesting part of the system is how it understands reviews. For example, if someone writes "This hotel is near Eiffel Tower," the system can understand that Eiffel Tower is a place and connect it to more information. This makes the system smarter. It can also understand what people like or don't like by reading their reviews. For example, if many people say "bad service," the system can find that easily.

The authors tested their system using real data from places like London and Sardinia. They created a very big knowledge graph with millions of connections, including thousands of hotels and many reviews. This shows that the system can handle a lot of data. It can be used in many ways like giving hotel suggestions, understanding customer feelings, and helping in travel planning.

But the system is not perfect. It depends a lot on the quality of data. If the data is wrong or incomplete, the results will also not be correct. Also, cleaning and organizing data takes time and effort. So it is not very easy to build such a system.

In the end, the paper shows a smart idea to connect tourism data and make it more useful. It helps both users and businesses. Users can get better suggestions, and businesses can understand customers better. Even though there are some problems, it is still a good step towards making travel systems more smart and helpful.

[9] Application of the Light weight BERT Model for the Warning of Tourism Public Opinion Emergencies

Tourism has grown a lot over time and along with that online platforms have become a major space where people share what they experience. If someone has a bad trip maybe in Goa or faces issues during a visit to Manali it usually does not stay limited to them anymore. They post reviews or write something online and it spreads quite fast sometimes faster than expected. Because of this keeping track of public opinion is not just something optional it becomes important especially when situations start going in a negative direction

Earlier research tried to solve this in a more basic way. Many studies used traditional machine learning methods like support vector machines or simple keyword based techniques. These worked in some cases. For example if people keep using words like bad service or dirty rooms it can give a signal that something is wrong. But the problem is people do not always speak so directly. Sometimes a sentence sounds normal but still carries dissatisfaction and these systems often failed to catch that. So they were useful but not fully reliable

After that deep learning models started getting attention. LSTM models were one of the commonly used ones because they could understand text in sequence. This means they could read a sentence in order instead of just picking random words. Because of this they were better at understanding longer reviews where people explain their experiences in detail. Still there was a limitation. These models need more computational power and are not always suitable when quick results are needed. In tourism timing actually matters because delays can make problems worse

Then transformer based models like BERT started changing things. These models understand context in a better way. Instead of looking at words separately they look at the full sentence and try to understand meaning based on surrounding words. So a sentence like not bad can be understood properly which older systems might misread. Later versions like RoBERTa and DistilBERT were developed to improve performance or make the models lighter. But at the same time these models are still complex and sometimes it feels like they are not always practical for continuous real time use.

In tourism applications these models are used to analyse social media and detect early signs of issues. Sometimes the change in public opinion is not very obvious. It can start slowly with small complaints or slight dissatisfaction. Transformer models are better at catching these patterns. Also when they are trained on tourism related data they perform even better because travel language is quite specific. Even then using only one data source like social media may not give a complete picture which is something many studies do not fully address.

To improve this some researchers started combining multiple models. Instead of depending on just one system they use ensemble methods where different models give predictions and the final result is based on all of them. This approach is generally more stable and reduces errors. It is not perfect but it works better in situations where data is complex or changing continuously

More recently there is a focus on making these models lighter. Large models give good results but they are not always practical. Techniques like pruning quantization and knowledge distillation are used to reduce model size while trying to keep performance similar. This becomes important in tourism systems where fast response is needed. A slow system cannot really help in preventing issues at the right time.

Even with all these improvements there are still some problems. Many studies use limited datasets which do not represent all types of users or regions. A model trained on one type of data may not work well in another situation. There are also challenges related to scalability and handling large amounts of real time data without slowing down

Because of this recent research is focusing on combining multiple tasks and data sources together.By multi task learning model can perform tasks like sentiment analysis and topic detection at the same time. This makes the system more flexible and improves understanding. It is closer to how people actually interpret information but it is still not perfect and needs more improvement.

If we look at the overall development there is a clear shift from simple machine learning methods to more advanced models that try to understand language deeply. Progress has definitely been made but there are still challenges related to efficiency adaptability and real time performance.

In this situation systems like NomadSense take a slightly different approach. Instead of using very heavy models it uses an AI based chatbot to respond to user queries quickly. The focus is more on speed and practical use rather than only high complexity. This approach may not solve everything but it does handle one important issue which is providing fast responses in tourism related situations.

III. PROPOSED SOLUTION

In today's world, users have to switch to different tabs or apps to gather travel-related information, as all information is not present on a single platform. They have to go to different tabs for checking nearby places and generating itineraries. If users have some questions, they have to use a different tab for using AI to answer their questions. Suppose an emergency arises during travel, they have to search for contacts for ambulance, police, etc. To check routes to travel to different places, they again have to use another tab. This leads to frustration and confusion among users, as they have to keep switching to different platforms. Also, users don't remember all the tabs they have used for planning the trip, as they might need to use them later on. To make the user's experience smooth, we propose a solution where all travel-related information is available on a single platform. We name it NomadSense.

Nomadsense is a single centralised platform where all travel-related information is available. Nomadsense is a blend of two words, 'Nomad' and 'Sense'. Nomad means someone who moves from one place to another, often used for travellers. Sense indicates awareness or the sense of travelling. So Nomadsense means showing travellers the sense of travelling.

Nomadsense has different components. These components are separated inside the app to make finding them easier. The app is made to reduce users' confusion while planning a trip to a particular place in India. This app is made for travelling, particularly in India. Figure 1 shows all the components in the Nomadsense app.

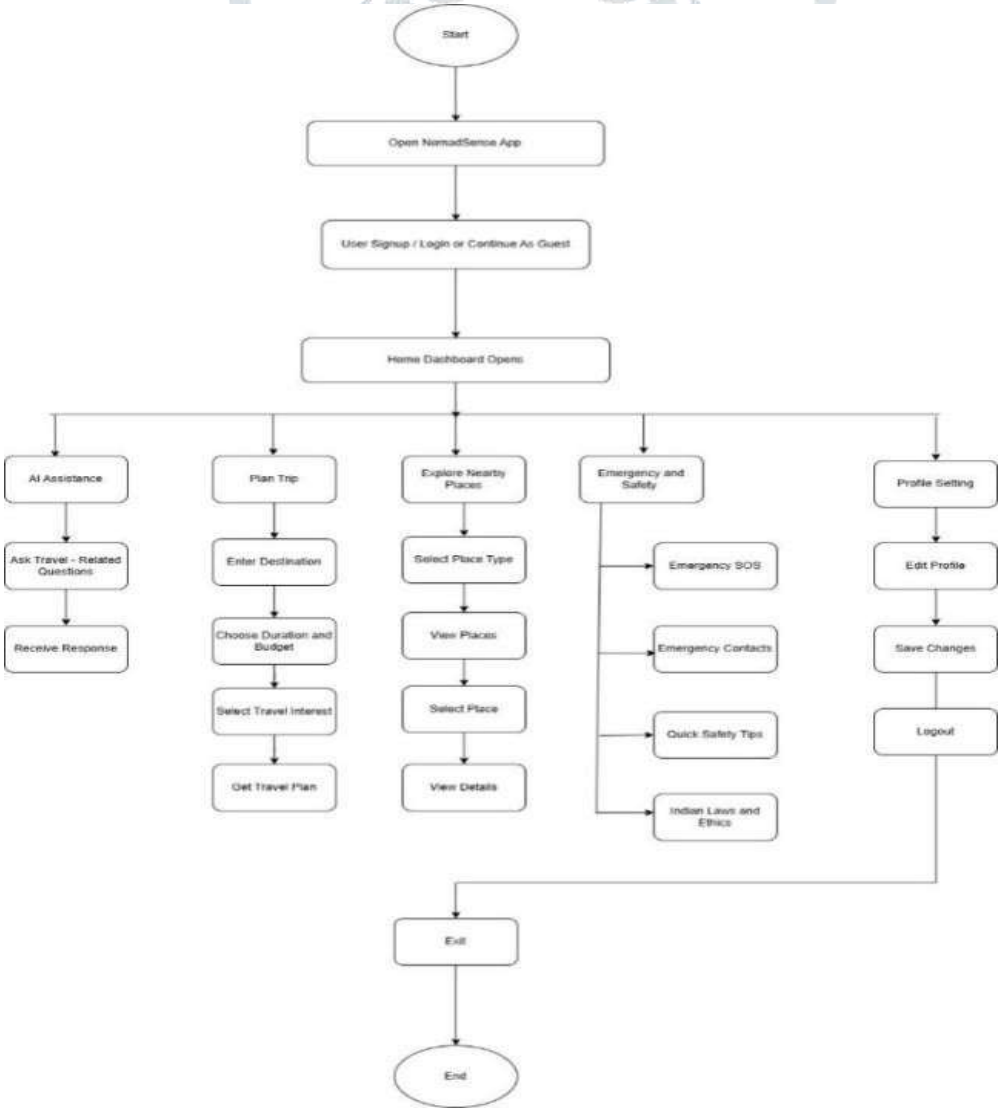

figure 1. components of nomadsense

When users open the app, they are first asked to log in by entering their name and email ID. If users don't want to log in and just want to explore the app, they can use the 'continue as a guest' option. One of the main advantages of logging in is that users' planned trips will get saved in trip history, while continuing as a guest doesn't have that privilege.

After the user logs in or chooses the 'continue as a guest' option, the user is directed to the homepage, where users can directly access all other components of the app. On the home dashboard, the user is first welcomed, and users can select different components: 'Ask AI', 'Plan Trip', 'Nearby', and 'Emergency'. The homepage also has a current base city option where users need to select their current city. The homepage also includes a travel toolkit. The travel toolkit has different components like a currency converter, local weather, cultural calendar, and phrasebook. In the currency converter, users can convert INR to USD and also to EUR. The user just needs to enter the amount in INR, and the system will show the equivalent value in USD and EUR. The local weather option displays the local weather of the current base city selected. It includes temperature, humidity, wind speed, etc. As this app is made specifically for India, and India is the land of festivals, the cultural calendar displays important cultural days in India. In the phrasebook, there are a few common word conversions between English and Hindi.

The component 'Ask AI' has an AI chatbot where users can ask travel- related questions and get answers to them. The user enters the question they need an answer to as input, and AI generates a response to it. The user doesn't need to know how it works internally.

In the itinerary section, users can plan trips. As all users don't have the same preferences and needs, the trip planner has different options like duration, budget, etc. First, the user needs to select the destination city where they want to travel. Next, the user needs to select the duration of travel, like 1 day, 2 days, 3 days, 5 days, 7 days, or 10 days. Then, the user needs to select a budget option like standard, luxury, or economic. Then, the user needs to select their different travel interests like history, food, nature, shopping, adventure, spirituality, and nightlife. In this travel interest section, users can select multiple options. In the end, the user needs to click the 'Generate My Plan' option. The system may take a few seconds depending on the input selected, and then generate a day-wise itinerary. The more specific the input, the better the plan will be generated. This section might first feel like filling a form, but how well plans are generated depends on the inputs users give.

Next is the nearby section. Based on the current base city selected in the homepage section, nearby places are shown. Users can filter nearby places with different options like attractions, food, police, health, and transit. In the attraction section, users will get the nearest attraction places. In the food section, users will get the nearest hotels and food areas with options for directions and calling. In the health section, users will get the nearest hospital name along with directions and a call option. In the police section, users will get the nearest police station. In the police section also, users will have direction and call options. In the transit section, users will get the address of the nearest bus, railway, or metro station.

In the safety module, the app has an emergency SOS button. Users need to select three people from their contact list. In case of emergency, on clicking the emergency SOS, an emergency signal will be sent to the three contacts which the user had selected while setting up the app, along with the user's location. Next in the safety module, there are emergency contacts like police, ambulance, women's helpline, and tourist helpline numbers. The next section has quick safety tips users will need while travelling to new places. As this app is made for India, we also have an Indian laws and ethics section in the safety module.

Next is the profile section. Like every other profile section, it also includes basic profile settings. This section also includes preference settings like language and mode. The app supports two languages, which include Hindi and English. Users can also choose between dark mode and light mode. The profile module also has an account and travels section where users can view their saved places, trip history, and safety settings. In safety settings, users can select the contact numbers to send the location in case of emergency when the emergency SOS button is clicked. The profile also has a help centre in which a basic guide on how to use the app is given. In the end, there is a logout option where users can log out of the app safely.

The app Nomadsense has many advantages. The main advantage is that it is a single centralised platform, so users don't need to switch to different tabs or websites while travelling or planning their trip. It highly smoothens the user experience and prevents users from unnecessary confusion and frustration. Also, this app is very easy to use.

In the AI chatbot, users need to enter their queries. The more specific the question asked, the better the response will be. Also, in the plan section, the clearer users are about their travel interests, the better the plan will be generated. So, the app is highly dependent on the inputs entered by the user.

In conclusion, Nomadsense is a single centralised platform for all travel- related information. The app is user-friendly and prevents confusion for users. This app can not only be used for planning trips but can also be used in case of emergencies.

IV. RESULTS AND DISCUSSION

The app solves one of the major problems users face while planning a trip, that is, scattered data. The information users need while planning their trip is not available in one place or on a single platform; it is all scattered across different platforms and websites. Our app Nomadsense was mainly developed to solve this problem. The app Nomadsense provides all travel- related information on a single platform. The app is also very easy-to-use and saves users' time in trip planning.

The testing of the app was done by our fellow peers. Most of the results obtained in the testing phase are positive.

The testing of the AI chatbot was done by giving many different queries which users may ask while using the app. It was observed that if the input or question given to the AI system was specific or clear, a better response was generated. Overall, the AI chatbot system works quite well, and the speed at which the response was generated is also quite high. Delay in generation of response is almost zero.

The evaluation of the itinerary planner was done by giving different inputs or, in some cases, no inputs in the travel interest section. Even if no input was given in the travel interest section, the system still generates an itinerary, but the itinerary generated is generic and sometimes may not align with the user's interest. However, if the user is quite specific about their travel interest and enters it, the generated response highly aligns with the user's travel interest and greatly increases user satisfaction. The testing was also done for the number of days and travel budget. For example, if the user enters two days, the itinerary planner should generate plans for only two days, not more or less. Also, if the user enters a standard budget, the system should not suggest very expensive or luxury experiences or places to visit.

The Nearby section was also evaluated by changing the current base city many times. It was observed that the responses generated are accurate. As we are entering the city, not the exact location where we are right now, the system's response level is not highly accurate. The Nearby section needs further improvement to generate responses suggesting nearby places with a higher level of accuracy.

The Emergency module worked as intended. All the sections of the emergency components worked properly. On clicking the emergency SOS, the emergency signal was sent to the contacts selected.

The user experience results are also very positive. The system is easy to use. The results on user experience suggest that the system is user- friendly, and as the app Nomadsense is a centralised system providing all travel-related information on a single platform, the confusion and frustration which users used to experience while planning trips earlier is also significantly reduced. Users can navigate easily between modules with a single click. Also, users do not need to remember different apps or websites they used while planning their trip.

The performance and efficiency results of the testing are also quite good. The AI chatbot response time is very fast. The response is provided by AI within a fraction of a second with a good level of user satisfaction. The trip planner or itinerary generation takes a few seconds to process the input and generate the trip. Overall, the app is quite smooth and features are reliable.

The app performed quite well overall. It highly improved user satisfaction by reducing tab switching during trip planning through its centralised design. Also, multiple features like AI chatbot, trip planner, nearby places, and emergency SOS are integrated into a single system. This integration of multiple features improved convenience for the user. As the responses generated are highly based on specific input in the itinerary generator and AI chatbot, the responses generated are personalised. Personalised responses improved users' satisfaction level. So, the overall interpretation of the result was highly positive.

Earlier, users had to use multiple apps/tabs to plan a single trip. It reduced user experience. It was also very complicated and not convenient. Now, a single centralised platform like our app Nomadsense exists, which improves users' experience and satisfaction level. Also, it became quite convenient for users to plan their trip. The major advantage our system holds over the traditional travel planning process is its centralised design, where users can plan their trip on a single platform without needing to switch to multiple tabs or apps.

Despite its advantages, the system Nomadsense also has some limitations. The system is highly dependent on user input quality. Good quality input generates a good response, while if the user's input is not specific, the generated response is not up to the level. When the input is not specific, the response generated is

generic. The system's scope is limited to India only. There is also a possibility of inaccuracies in responses generated by the AI chatbot. Also, the system will not work without internet. The system will not work in places where there is no mobile network or internet connectivity. The system needs a stable internet connection to work properly as intended.

In conclusion, the app simplifies travel planning by providing all travel- related information on a single page. It also improves users' experience while planning their trip or while travelling. Emergency and Nearby modules can become quite handy while travelling to new places in India. The app also has potential for future improvements. Future improvements might include increasing accuracy in the Nearby section, expanding the app to cover other countries too, etc.

V.CONCLUSION

In this paper, the NomadSense system is introduced as a simple and practical travel assistant that tries to make trip planning a bit easier for users. Usually people end up using multiple apps at the same time. One for booking tickets, another for maps, and maybe something else for checking reviews. It works, but it also becomes a bit messy , cofusing and time consuming after a point. NomadSense is basically trying to reduce that confusion by bringing everything into one place

The system includes several modules like AI assistance, trip planning, nearby places, safety features, and profile management. Each of these has a specific purpose but they are connected in a way that the overall experience feels smooth. For example the chatbot helps when users want quick answers without searching too much. The trip planning part helps organise things like budget or duration. There is also a feature to explore nearby places which makes it easier to decide what to visit. The safety module is also included which gives useful information that can matter during travel especially in unfamiliar locations

The design of the system is kept simple on purpose. It is not something that requires strong technical knowledge to use. Even users who are not very comfortable with apps can still manage it without much trouble. It also accepts different types of inputs. Some users might give detailed information while others may just type a few words. The system tries to handle both. Of course it is not always perfect. If the input is too vague or confusing the results may not be very accurate but in most normal cases it works reasonably well

From the results and testing it seems that the system can take user data process it and generate outputs that are actually useful. A lot depends on how the data is handled in the background. Proper structuring and preparation of data makes a noticeable difference in performance. The inclusion of safety related features also adds some practical value which is often missing in basic travel apps

At the same time there are a few limitations that cannot be ignored. The system depends quite a bit on the quality of input and available data. If either of these is weak then the output also gets affected. There is also scope to improve the system by adding more advanced features like better AI understanding real time updates or even integration with booking platforms. Right now it feels like a good base but not a complete solution.

Looking ahead NomadSense can definitely be developed further into something more refined. With better data and some improvements in features it can become more accurate and more reliable. Overall it is a good attempt at simplifying travel planning and making things faster and more organised. It is not the final solution but for someone who just wants to plan a trip without too much hassle it does help a lot.

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