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YatraYojana: Leveraging Kotlin and Firebase for Tailored Tourist Recommendations

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ABSTRACT: Planning a tour in detail is crucial. There are many online tourism applications available, but they do not cover all user requirements related to planning of a tour in a single platform. The existing applications do not provide any recommendation system for tour itineraries, the best place to stay, hotels, weather updates for the location, and the best time to visit in a single application. A user has to visit multiple websites and applications for their complete tour. Our proposed Geo-enhanced tourism application, YatraYojana, will provide all the aforementioned features in a single platform. This application will include tour destinations search, itinerary planning, weather updates for the location, nearby hotels, a location-based recommendation system, integrated map that will be tailored to users' present location or desired destination. There will also be a user-friendly chatbot to answer user queries. By combining all these features YatraYojana application will make tour planning, and user experience better. Now users will bid goodbye to stress, and say hello to awesome adventures .

KEYWORDS: YatraYojana, Tourism application, Itinerary, Geo-Enhanced application, Recommendation system, Real-time weather updates, Integrated G-map, Budget planning, chatbot, User-friendliness.

I. INTRODUCTION

In India, the process of planning and organizing a tour is challenging for tourists, as they struggle to plan the itinerary, best place to stay with respect to the itinerary, finding a good pocket-friendly hotel, best time to visit, budget planning, weather updates, and a map for navigation. There is no application available today which provide all these features on a single platform. Today there are various tourism websites and applications available. Some of these provide some functionalities such as search for places, best places to stay, google map for navigation, while some provide recommendation for itinerary, best time to visit etc. A user has to visit multiple websites and applications for planning their complete tour.

In this paper we propose a mobile application, YatraYojana, for Android users that provides a comprehensive solution to travelers needs that we discussed above. This application will provide the features like itinerary, finding a good pocket-friendly hotel, best time to visit, budget planning, weather updates, and a integrated map for navigation in a single platform, so that users do not need to visit different websites and applications for their needs. There will be a user-friendly chatbot to answer user queries. Our proposed system will also facilitate hotel booking

The development of our application will utilize a robust technical stack to ensure optimal performance and user experience. We will leverage Java and Kotlin for Android development, utilizing the Android SDK for native mobile application development. Geographic Mapping System technology will be integrated using the Google Maps API for location searching and navigation assistance. Real-time weather updates will be sourced from weather APIs such as OpenWeatherMap. By combining all these features YatraYojana application will make tour planning, and user experience better.

The subsequent sections of the paper are structured in the following manner: Section 3 shows the related work followed by the proposed system and its architecture in Section 4. Section 5 formally defines the result analysis of our research



work. Finally, Section 6 concludes the manuscript.

II. PROBLEM STATEMENT

The primary goal of this application is to save the user time and provide a simple platform. If individuals want to organize a trip, they would typically try to book all alternatives such as buses and hotels using an internet platform. However, many platforms only allow booking one aspect of the trip at a time. If you want to plan a multi-day trip with your family and book everything at once including buses, hotels, and activities existing applications fall short. Users are forced to visit different websites or apps for each need, from checking the weather to finding accommodations. Additionally, features like GPS, budget tracking, and recommendations based on user searches are scattered across various applications. Even for basic information, like learning about a destination, users resort to searching on Google due to the lack of comprehensive options. This fragmented experience not only consumes time but also leads to frustration. Users may seek alternatives that offer more comprehensive solutions or search for an all-in-one application that meets their needs.

III. RELATED WORK

This tourism application very useful for the users because all the facilities are available in the only single application. That is the reason why many researchers have explored this topic as their interest of research. The key findings are discussed in the Table I below:

TABLE I. Literature Survey

Citation	Key Findings
[1]	They proposed a system that automatically infers the users' preferences from their TV viewing histories, i.e., the tourism resources the users might appreciate are selected by considering the TV content they enjoyed in the past.
[2]	The effectiveness of the sentiment lexicons for sentiment categorization at the document and sentence levels was evaluated using an Amazon product review data set and a news headlines data set.
[3]	In this arena, this paper presents a music recommendation system based on a sentiment intensity metric, named enhanced Sentiment Metric which is the association of a lexicon-based sentiment metric with a correction factor based on the user's profile.
[4]	Preparation of an interactive map of the Central Development Region Determining the potential area for tourism in CDR.
[5]	This paper aims to contribute in Indian economy
[6]	This paper aims to design a multimedia system in the field of cultural tourism that is based on this phenomenon and combined with multiple media technologies, relying on the We Chat mini program platform.
[7]	Tourism information sharing service platform with tourism data collection, sharing data standard and data collections. Functions enable to function such platform tourist gathering monitoring and early warning system their analysis.



[8]	Optimizing the Quality of Tourism Services to Drive the Development of the Tourism Industry. Strengthen Supervision of the Tourism Market.
[9]	Establishment of a Data Platform, Optimize the Allocation of Tourism Resources, Tourism Safety Management
[10]	The Relationship between the Metaverse and the Cultural Tourism Industry
[11]	This paper, taking “Suizhou Tourism App” as an example, applied service design methods to analyze how to design a user-centered comprehensive platform for tourism information and services.
[12]	The web application has become more and more reliant upon a large amount of database and unorganized data such as videos, images, audio, text, files, and other arbitrary types. It is difficult for a Relational Database Management System (RDBMS) to handle unstructured data. Firebase is a relatively new technology for handling large amounts of unstructured data.
[13]	This research paper aims to provide a comprehensive overview of various approaches to recommendation systems, which are crucial in aiding users in decision-making processes by suggesting items of interest. The paper discusses the purpose, significance, and challenges of recommendation systems in today's digital landscape.

We discussed the previous studies on social media platforms. However, these papers didn't cover some important aspects. In this paper, we'll introduce new features. Artificial Intelligence (AI) has been gaining a lot of attention and growing rapidly each year [4]. So, we're going to enhance our research by incorporating AI features into it. In the next section, we will discuss our proposed system.

IV. PROPOSED SYSTEM

A. System Architecture

Planning and organizing a trip in India can be challenging for travelers. They struggle to figure out where to go, where to stay, and how to stick to their budget. Finding a good, affordable hotel, knowing the best time to visit is the challenge. Currently, there's no single application that covers all these needs. Instead, tourists have to go through between different websites and applications. Some Websites offer information about places to visit and stay, while other applications provide maps for navigation or suggest itineraries. This means users have to hop around different platforms to plan their entire trip.

The existing applications do not provide any recommendation system, itineraries, best place to stay, hotels, weather updates for the location, and the best time to visit in a single application. A user has to visit multiple websites and applications for their complete tour. To address these challenges, We will provide the features like best places to visit, near by hotels to stay, itenary planning, weather checking, Budget checking, integreted google map, userfriendly chatbot, and recommendation system in a single platform so user do not need to visit different websites and applications

for their needs.

Fig. 1 illustrates the structure of the social network system, which comprises multiple models integrated with a comprehensive database system. In the subsequent sections, we will provide a detailed breakdown of its various components.

1. *Authentication Manager*: new users are required to provide their email and other personal details during the registration process. Firebase is used for the authentication and managing the credential for the users.
2. *Search Manager*: User can search best places to visit after deciding a destination, travelers often need a place to stay. The Search Manager makes this process easy by allowing users to find hotels, resorts, or other accommodations near the places they want to visit
3. *Weather Manager*: This application will provide current weather condition for destination and best time to visit. Users can typically input or select different locations to check the weather, which is especially helpful for travelers or people with friends and family in different areas.

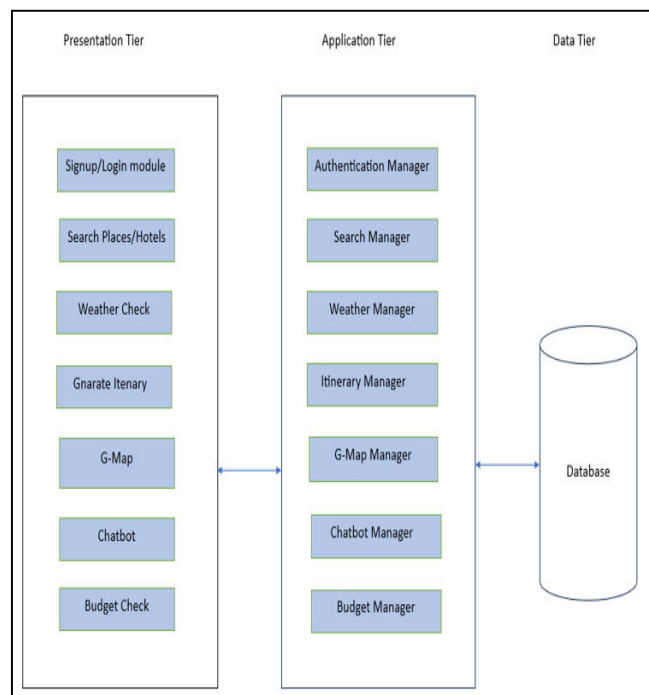


Fig.1: 3-Tier Architecture Diagram

4. *Generate Itinerary*: This module generates the itinerary tour plan when the user adds the source and destination. It recommends the best places to visit, nearby hotels to stay, and restaurants to eat.
5. *G-Map*: This module aim of integrated Global Positioning System (G-Map) is to show the path according to user search and Seamless integration with Google Maps offers users interactive maps for navigation.
6. *Chatbot*: There is a chatbot assistant in our application for solve the user queri. Chatbot assistants interact with users through text-based interfaces.
7. *Budget Check*: When user have planning the trip at this time by entering the source and destination the itinerary will be generate whole tour with budget.

A. Implementation

This section demonstrates the methodology which we have used to implement the proposed system. It aims to give an

overview of the tools and technologies used for the development. Firstly we will discuss the code editor setup and the various extensions used in it. Next, we will discuss the hardware that we have used followed by the software configuration.

Android Studio served as our go-to tool for not only editing and debugging code but also for managing both server-side and client-side development. Throughout the paper, our hardware configuration comprised essential components that played a pivotal role in ensuring efficient performance. This setup featured 8GB of RAM, providing ample memory for smooth multitasking and quick data access. Additionally, a 512GB Solid State Drive (SSD) and a 1TB Hard Disk Drive (HDD) formed the storage backbone, with the SSD delivering fast data retrieval and the HDD offering substantial storage capacity for paper assets. The CPU was powered by an Intel Core ryzen5 processor, known for its processing power and versatility in handling a wide range of tasks. Together, these hardware specifications created a robust foundation for our Paper's computing needs. During the research, our software configuration comprised of Windows operating system, providing a familiar and reliable environment for our development efforts. The technologies employed were a diverse array of powerful tools and for creating the user interface and application logic. On the server side, Firebase played integral roles in backend functionality. Incorporating cutting-edge technologies such as Kotlin, Java. This extensive software stack was carefully selected and integrated to meet the Paper's diverse requirements and deliver an exceptional user experience. For optimal compatibility and testing, we used the Android phones.

The implemented methodology has successfully addressed the research objectives outlined in this study. The results of selected tools and experimental setup will be discussed in the next section.

V. RESULT ANALYSIS

Our software development approach employed a methodical and iterative process, specifically adhering to the agile methodology. This choice was motivated by the numerous advantages that Agile presents over the conventional waterfall model. A primary strength lies in its inherent flexibility. Unlike the linear and inflexible nature of Waterfall, Agile divides the paper into smaller, more manageable sections. This breakdown permits continuous updates and adjustments, which can swiftly respond to the evolving requirements and preferences of both developers and end-users. In essence, Agile's iterative and customer centric approach significantly enhances the likelihood of paper success.

A. *Simulation Setup*

In this study, we leveraged the Lighthouse [21] tool within the Chrome DevTools [22] ecosystem as an integral component of our simulation setup. Lighthouse provided comprehensive insights into web performance, loading times, and overall user experience metrics. By utilizing its auditing capabilities, we assessed key aspects such as Search Engine Optimization (SEO), Accessibility, Performance and Best Practices allowing for a detailed examination of the simulated environment. The integration of Lighthouse not only facilitated a more thorough analysis but also ensured alignment with industry standards for web development best practices. This approach enhances the reliability and relevance of our simulation results, providing a strong foundation for drawing meaningful test results.

B. *System Requirements*

Our primary objective is to create a set of software modules that are not only interconnected but also adaptable to future changes and enhancements. This flexibility ensures the potential for reusing the system in various applications beyond its initial development purpose. To ensure broad accessibility, we set minimum user requirements at a modest 2GB of RAM, 250GB of HDD storage, and the use of any standard web browser with an internet connection.

C. *Experimental Evaluation*

To evaluate the prototype, we used white-box testing methodology. Our testing approach encompassed a comprehensive examination, involving unit testing, integration testing, and selective retesting. We crafted whitebox [8] test cases, probing each unit of the system to check its correctness in coding. This approach further involved a detailed evaluation of the interconnections between various system components, ensuring the integrity of the overall system. Our testing strategy was designed to uncover and address any potential issues, ultimately contributing to the reliability and effectiveness of the prototype.

D. Performance Analysis

This section presents graphical analysis of the numerical results produced during simulation. In Figure 2 different parameters and its test result is observed using lighthouse tool. The threshold value for each parameter is given as 0-49: Poor, 50-89: Needs Improvement, 90-100: Good [23].



V. CONCLUSION AND FUTURE SCOPE

In this paper, we have proposed a android application that overcomes existing limitations, offering a user-friendly, interactive, and feature-packed platform for enhancing user experience and collaboration with the help of cutting-edge technologies like Kotlin, Java, Firebase, and API . Key features include a chatbot for customer support, finding a good pocket-friendly hotel, budget planning, weather updates, and a map for navigation, Recommendation System. To implement the proposed system we designed the system architecture. We performed extensive simulations to justify the performance of our proposed approach, our future endeavors aim to enhance its capabilities to generate itinerary . Also to improve the application, eliminate unused code, and optimize the overall codebase for improved efficiency. Through these ongoing developments, we anticipate providing an even more tailored and efficient user experience in the future.

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