GoAI: Your Smart Travel Buddy

Purva Kavthekar, Prathvi Poojary, Shraddha Sangale, Prof. Mohan Bonde

Abstract— **Travel planning can be challenging as it requires balancing user preferences, budget, time constraints, and destination details. Many travellers rely on multiple platforms to organize their trips, which makes the process time-consuming and complex. With the advancement of Artificial Intelligence (AI), automated itinerary planners can now generate personalized and optimized travel schedules more efficiently.**

This paper presents an AI-driven itinerary planner developed using the Iterative Software Development Model to allow continuous improvement through repeated cycles of analysis, design, and testing. The system uses machine learning and natural language processing techniques to recommend relevant points of interest, organize routes, and adapt plans based on user input. Real-time data from APIs such as Google Places and Open Weather ensures that recommendations remain accurate and context aware.

Unlike traditional static travel tools, the proposed system offers flexibility, customization, and scalability. By combining personalization with real-time data integration, the system reduces manual effort and enhances the overall travel planning experience.

Index Terms— ***Artificial Intelligence, Travel Itinerary Planning, Machine Learning, Natural Language Processing, Personalized Recommendations, Real-Time Data, Route Optimization, Smart Tourism***

I. INTRODUCTION

Planning a trip is often exciting, but creating a well-organized itinerary can quickly become challenging and time-consuming. Travelers need to balance multiple factors such as personal interests, budget, time constraints, weather conditions, and transportation options. This often leads to spending significant effort on researching destinations, comparing alternatives, and repeatedly adjusting plans, making the overall process complex.

Advancements in Artificial Intelligence (AI) provide an effective way to simplify travel planning. By integrating techniques such as recommendation systems, natural language processing, and optimization, AI-based systems can generate personalized itineraries tailored to individual preferences. In addition, the use of real-time data, including weather updates and place availability, allows these systems to adapt plans dynamically and improve their relevance.

This paper presents the development of an AI-driven itinerary planner using the Iterative Software Development Model. The approach supports continuous improvement through cycles of analysis, design, implementation, and testing, while incorporating user feedback at each stage. The system enables users to input their preferences and generates optimized, flexible travel plans, ultimately reducing manual effort and enhancing the overall travel experience.

Manuscript received May 9, 2026

Under the Guidance of Prof. Mohan Bonde

Purva Kavthekar, Data Science/ 28 Usha Mittal Institute of Technology Mumbai, Maharashtra

Prathvi Poojary, Data Science / 54 Usha Mittal Institute of Technology, Mumbai, Maharashtra

Shraddha Sangale, Data Science / 54 Usha Mittal Institute of Technology Mumbai, Maharashtra

II. LITERATURE SURVEY

Personalized itinerary planning has gained significant attention in recent years due to the increasing demand for customized travel experiences. S. Halder presents a comprehensive survey on personalized itinerary and point-of-interest (POI) recommendation systems. The study classifies existing approaches into collaborative filtering, content-based, and sequence-based models, with a strong emphasis on deep learning techniques. It also highlights key evaluation metrics and discusses the trade-offs between user satisfaction and service provider objectives, while emphasizing the importance of multimodal data in enhancing recommendation accuracy [1].

Recent advancements have explored hybrid approaches that combine artificial intelligence techniques with traditional planning methods. T. de la Rosa *et al.* propose TRIP-PAL, a system that integrates large language models (LLMs) with classical planning algorithms. In this approach, LLMs are used to generate initial itinerary drafts, which are then refined using optimization techniques to satisfy constraints such as travel time and scheduling. This hybrid method improves both flexibility and feasibility in itinerary generation [2].

Another significant direction involves modelling itinerary planning as a sequential decision-making problem. S. Chen *et al.* utilize deep reinforcement learning (DRL) to select points of interest in a way that maximizes cumulative user satisfaction under constraints such as time and budget. Their approach demonstrates improved performance over traditional greedy algorithms, particularly in delivering personalized recommendations [3].

In addition to itinerary generation, related research has explored service integration within travel platforms. B. Rogers discusses the concept of on-demand service models, such as ride-hailing platforms, which rely on real-time matching algorithms to connect users with nearby service providers efficiently [4]. Extending this idea, L. Chen highlight the importance of transparency, including pricing, user ratings, and verification mechanisms, in building trust within such systems [5]. These principles can be adapted to tourism applications to enable reliable and flexible on-demand tour guide services.

III. PROPOSED METHODOLOGY

The development of the proposed AI-based itinerary planner follows a structured and modular methodology designed to ensure scalability, reliability, and adaptability. The system is built using the Iterative Software Development Model, enabling continuous refinement through repeated cycles of analysis, implementation, testing, and improvement. This approach allows incremental enhancement of features while incorporating user feedback at each stage.

A. Requirement Analysis

The initial phase involved identifying both functional and non-functional requirements of the system. Key user inputs include destination, travel duration, budget, number of travellers, and areas of interest. System constraints such as attraction timings, estimated visit duration, travel distance, and cost limitations were also considered. Security, scalability, and real-time adaptability were defined as essential non-functional requirements.

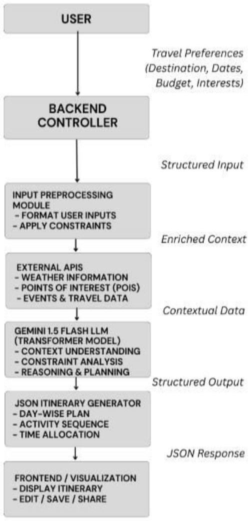

Fig 1: Workflow of the working of the system

B. Data Collection and Preprocessing

The system utilizes both static and real-time datasets. During initial development, structured demo datasets were created for points of interest (POIs), hotels, and tour guides to simulate realistic system behaviour. In later stages, external APIs such as Google Places and Open Weather were integrated to fetch real-time information including attraction details, ratings, geographic coordinates, and weather updates. Data preprocessing includes filtering, sorting, and structuring results into standardized formats suitable for itinerary generation.

C. AI-Based Itinerary Generation

The core itinerary generation process is powered by a transformer-based Large Language Model (LLM). The model processes structured user inputs along with contextual information retrieved from APIs. Based on constraints such as time, budget, and preferences, the system generates a structured JSON-based day-wise itinerary. The output includes recommended attractions, optimized visit sequences, and estimated time allocation for each activity. This design ensures flexibility while maintaining structured planning.

D. Heuristic Fallback Mechanism

To maintain system reliability, heuristic algorithms are implemented as fallback mechanisms in cases where AI-based generation is unavailable or delayed. Points of interest are first sorted using the Timsort algorithm based on ratings

and popularity. A Greedy Approximation strategy, inspired by the knapsack problem, is then applied to select attractions that satisfy time and budget constraints. This ensures that the system consistently produces a feasible itinerary even under service limitations.

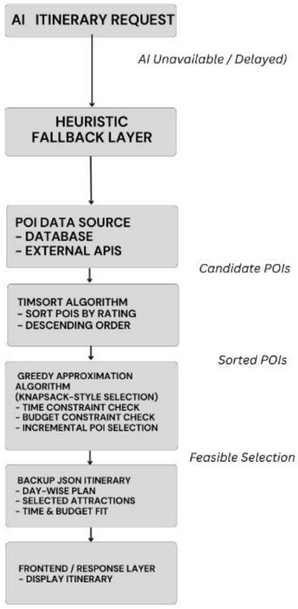

Fig 2: Workflow of the Heuristic Fallback Algorithm

E. Tour Guide Matching and Route Visualization

The tour guide hiring feature follows a location-based matching approach. A structured guide dataset containing attributes such as experience, language proficiency, hourly rates, and ratings is used for allocation. Guides are filtered based on availability and proximity to the selected destination. For route visualization, the Folium mapping library is integrated to display interactive maps with location markers and travel paths. This improves transparency and enhances user experience by visually representing guide and destination locations.

F. Security and Authentication

Security is implemented using BCrypt hashing for password protection and JSON Web Tokens (JWT) signed with the HS256 algorithm for session management. Passwords are securely stored in hashed form, and authenticated users are issued signed tokens for authorized access to protected resources. This ensures data confidentiality, integrity, and secure session handling.

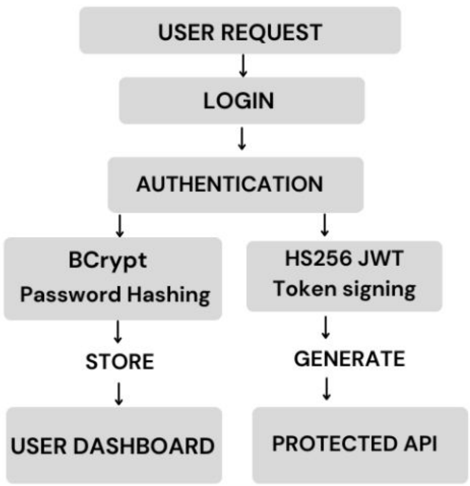

Fig 3: Security Algorithm Workflow

G. System Architecture and Workflow

The backend follows a layered architecture consisting of client interaction, API gateway, authentication module, AI generation module, fallback heuristic layer, external API integration, and database management. User requests are validated through secure authentication before being processed by the AI engine or fallback module. Generated itineraries are stored in structured format and returned to the frontend for visualization, editing, and download.

IV. SYSTEM DESIGN AND IMPLEMENTATION

The system design of the proposed AI-based itinerary planner focuses on modularity, scalability, and secure data management. The architecture integrates database design, frontend interface development, and backend processing to ensure seamless interaction between users and intelligent planning modules.

A. Database Design

The system uses a relational database structure to ensure organized storage and efficient retrieval of travel-related information. The database manages user profiles, travel sessions, generated itineraries, hotels, tour guides, reviews, and emergency services in a structured manner. The **Users** table stores personal and preference details, while each trip request is recorded in a **Travel Sessions** table. Generated itineraries are stored in JSON format and linked to corresponding user sessions.

Additional tables handle hotel information, guide registration and availability, booking records, and user reviews. Proper relationships and normalization techniques are applied to reduce redundancy and maintain data integrity. This design supports scalability and ensures smooth data access for itinerary generation, guide matching, and other system functionalities.

Field Name	Data Type	Description
user_id (PK)	INT	Unique ID for each user
name	VARCHAR	Name of the traveller
email	VARCHAR	Email for login and communication
age_group	VARCHAR	Age category of travellers
number_of_travellers	INT	Total number of travellers
preferences_json	JSON	Stored preferences for personalization

Fig 4: Users Table

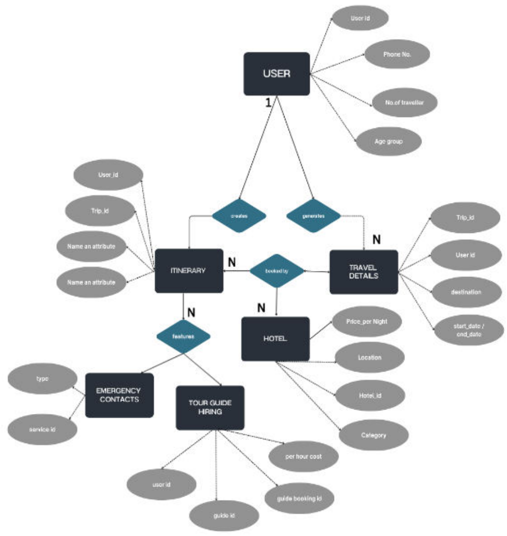

Fig 5 : Entity-Relationship Diagram for AI Itinerary planner.

B. Frontend Design

The frontend of the system is designed to provide a clean, intuitive, and interactive user experience. It allows users to input travel preferences such as destination, duration, budget, and interests through structured forms. The interface dynamically displays generated itineraries in a day-wise format, enabling users to review and modify plans as needed. Interactive features such as map visualization, guide selection panels, hotel filtering options, and itinerary download functionality are integrated to enhance usability. The frontend communicates with backend services through secure API calls and presents responses in an organized and user-friendly layout. The design prioritizes responsiveness and clarity to ensure ease of navigation across devices.

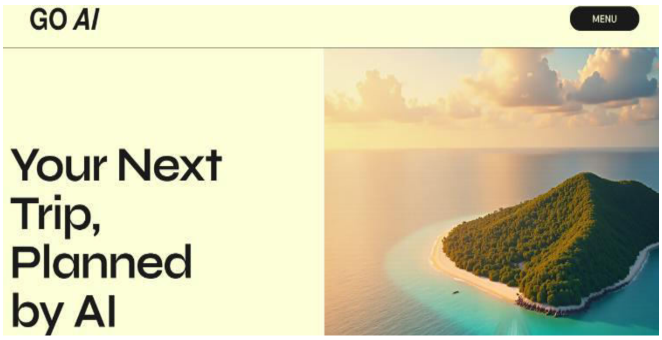

Fig 6: Home Page Design

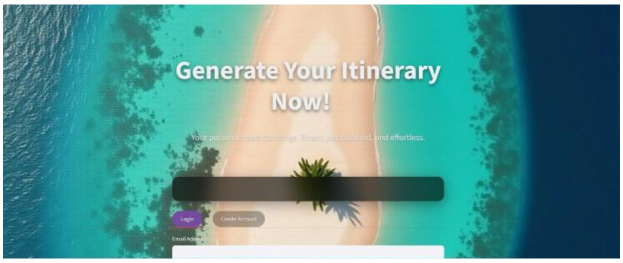

Fig 7: Use Sign-up / Login Page

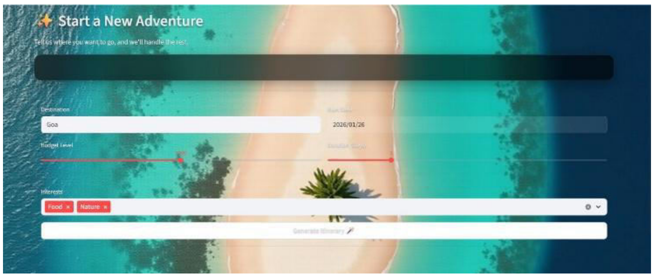

Fig 8 : User Inputs Page

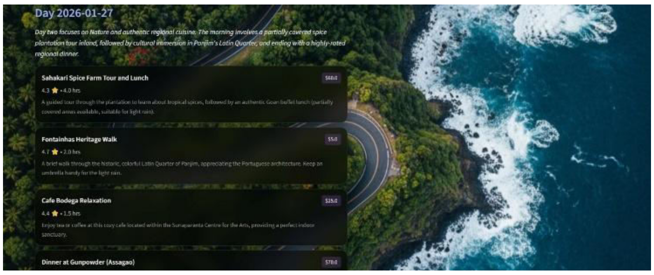

Fig 9 : Itinerary Generation Page

C. Backend Design

The backend architecture is developed using a modular and layered approach to handle request processing, AI computation, data storage, and security management. It serves as the core processing unit of the system.
User authentication is secured using BCrypt-based password hashing and JWT tokens signed with the HS256 algorithm. This ensures secure session management and protects sensitive user information.
The AI module processes structured user inputs and integrates contextual data retrieved from external APIs. It generates day-wise itineraries in JSON format. In cases where AI services are unavailable or delayed, a fallback heuristic mechanism is activated. This mechanism sorts of attractions based on rating and applies a Greedy Approximation algorithm to generate a feasible itinerary within time and budget constraints.
The backend also manages tour guide matching, hotel filtering, review aggregation, and route visualization integration using the Folium library. All system components interact through defined APIs, ensuring smooth communication between modules.

D. System Workflow

The overall workflow begins when a user submits travel preferences through the frontend interface. The request is authenticated and processed by the backend. The AI engine generates an optimized itinerary using real-time contextual data. If required, heuristic planning ensures continuity of service. The final itinerary is stored in the database and returned to the frontend for visualization, editing, and offline download.
This integrated design ensures reliability, adaptability, and scalability while delivering a personalized and user-centric travel planning experience.

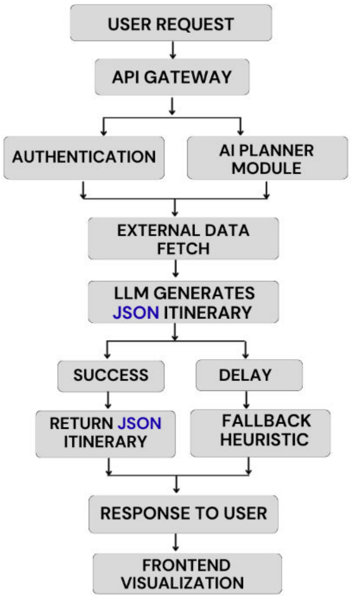

Fig 10: System Workflow

V. MODULE IMPLEMENTATION

The proposed AI-Based Itinerary Planner is divided into multiple functional modules to ensure modularity, scalability, and efficient system performance. Each module is responsible for a specific task within the overall workflow.

A. User Management Module

This module manages user registration, authentication, and profile handling. It uses \textbf{JWT (JSON Web Token)} for secure login sessions and ensures that user data remains private. The module validates input fields, stores user details in the database, and enables users to view or update their profiles. The module also maintains travel history and previous itineraries for quick access and personalization.

B. Itinerary Generation Module

The itinerary generation module is the core component of the system. It processes user inputs such as destination, duration, budget, and interests. Using AI-based processing, the system generates structured, day-wise travel plans. The output is formatted in JSON to allow flexibility and easy modification. In case the AI service is unavailable, a fallback heuristic algorithm is triggered. Attractions are sorted based on ratings and selected using a greedy approximation strategy to satisfy time and budget constraints

C. Tour Guide Matching Module

This module enables users to hire local tour guides based on location, experience, rating, and availability. Guide data is filtered according to the selected destination. The system simulates a ride-hailing style matching mechanism, where users can select guides on an hourly basis for flexible touring.

D. Hotel Recommendation Module

The hotel module provides accommodation suggestions based on user budget and proximity to selected attractions. Filtering options allow users to choose hotels based on ratings, price range, and amenities.

E. Route Visualization Module

The route visualization module integrates the Folium mapping library to display interactive maps. It marks selected attractions and shows optimized travel routes. This helps users understand distances and travel flow more clearly.

F. Offline Access and Download Module

To ensure accessibility in low-network areas, the system allows users to download their generated itinerary as a PDF. This feature improves usability during actual travel execution.

G. Social Media Insight Module

This module enhances destination awareness by integrating social media insights, such as Instagram reel links related to selected destinations. It helps users compare expectations with real-world visuals before visiting a place.

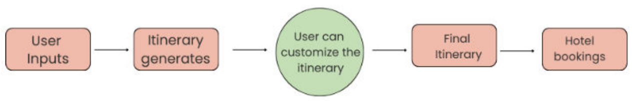

Fig 11: Module Implementation Flow Chart

VI. RESULT ANALYSIS

The proposed AI-Based Itinerary Planner was evaluated based on usability, personalization accuracy, response time, and overall user satisfaction. The system was tested using multiple user scenarios with different inputs such as travel duration, budget range, preferred activities, and destination choices. The results indicate that the model successfully generated structured and optimized itineraries within a short response time, ensuring smooth user interaction.

The recommendation engine demonstrated effective personalization by adapting itineraries according to user-defined interests such as cultural tourism, adventure travel, food exploration, and budget constraints. When compared with traditional static travel packages, the system provided significantly higher flexibility, allowing users to modify plans dynamically without restarting the entire process.

Route optimization using the map integration (Folium-based visualization) ensured logical sequencing of destinations, reducing unnecessary travel time between attractions. The tour guide hiring module successfully matched users with demo guide data based on rating and experience, simulating a real-world guide booking system like ride-hailing platforms.

The Instagram insights feature enhanced decision confidence by allowing users to visualize realistic destination content before finalizing plans.

Overall, the results validate that the proposed system effectively transforms traditional travel planning into an intelligent, personalized, and adaptive digital experience.

VII. CONCLUSION

The proposed AI Itinerary Planner demonstrates how artificial intelligence can effectively simplify and personalize the travel planning process. By analyzing user preferences and combining them with intelligent recommendation techniques, the system generates structured, optimized, and customizable itineraries tailored to different travel styles. Integrated features such as hotel recommendations, location-based tour guide hiring, community reviews, social media insights, emergency assistance, and offline itinerary access further enhance the practicality of the platform.

The project shows that traditional travel planning, which is often complex and time-consuming, can be transformed into a streamlined and automated experience through data-driven decision support. Although the current implementation focuses on core functionalities, it provides a strong foundation for future enhancements such as advanced personalization, deeper real-time integration, augmented reality exploration, and predictive analytics.

Overall, the AI Itinerary Planner serves as a smart travel companion that improves convenience, safety, and overall travel satisfaction for modern users.

VIII. FUTURE SCOPE

The AI Itinerary Planner has strong potential to evolve into a comprehensive smart tourism platform. In future developments, the system can integrate real-time travel APIs for flights, trains, buses, and local transport services to provide live availability updates, dynamic pricing alerts, and travel status tracking. The review ecosystem can be enhanced using sentiment analysis techniques to automatically evaluate and classify traveller feedback from platforms such as social media and travel websites, enabling more informed decision-making.

Advanced visual recommendation features may also be introduced, allowing users to explore destinations through trending travel content and seasonal highlights. Augmented Reality (AR) previews could offer virtual landmark exploration before actual visits. The platform can further expand by onboarding verified hotels, guides, and local businesses for secure in-app bookings and payments.

Additional improvements may include multilingual voice assistance for accessibility and enhanced emergency support through live geolocation tracking and SOS alerts. As user interaction data grows, advanced personalized recommendation models can be implemented to generate highly customized itineraries based on travel history and behaviour patterns.

Overall, the system has the capability to develop into a real-time, intelligent, and globally adaptive travel companion that transforms the travel planning experience.

REFERENCES

[1] S. Halder, "A Survey on Personalized Itinerary Recommendation," *ScienceDirect*, 2024.

[2] Google Developers, "Google Places API Documentation," Google Maps Platform. [Online]. Available: https://developers.google.com/maps/documentation/places

[3] OpenWeather, "Weather API Documentation." [Online]. Available: https://openweathermap.org/api

[4] Folium Developers, “Folium: Python Data Visualization on Interactive Leaflet Maps.” [Online]. Available: https://python-visualization.github.io/folium/

[5] M. Jones, J. Bradley, and N. Sakimura, “JSON Web Token (JWT),” RFC 7519, Internet Engineering Task Force (IETF), May 2015.

[6] N. Provos and D. Mazières, “A Future-Adaptable Password Scheme,” in *Proc. USENIX Annual Technical Conference*, 1999.

[7] I. Sommerville, *Software Engineering*, 10th ed. Harlow, U.K.: Pearson, 2016.