

AI-Driven Destination Planning Insights

Sinchana K Y¹, Thejas K U², Ankith T S³, Prajwal Gowda L T⁴

^{1*}Department of Computer Science and Engineering,
Sri Siddhartha Institute of Technology, SSAHE University,
Tumkur, 572105, Karnataka, India. Member, IEEE.

Contributing authors: Dr. GuruPrasad, Department of Computer Science & Engineering, Sri Siddhartha Institute of Technology, SSAHE University, Tumkur, 572105, Karnataka, India.

Abstract

Beyond just travel logistics, this app goes a step further by offering integrated healthcare facilities. In case of emergencies, users can instantly access an option to book ambulances, contact hospitals directly, and receive immediate guidance for temporary relief until professional help arrives. This app simplifies trip planning while providing healthcare support, real-time booking options, and comprehensive details about hotels, tourist spots, and local transportation, advancing it a complete travel companion for modern-day travellers. The **blending of cybersecurity measures** has become vital, ensuring that sensitive information such as travel plans, financial transactions, and personal data remain safe.

AI-powered chatbots can enhance user experience by offering real-time assistance. However, as these chatbots become more prevalent, cybersecurity must be a core consideration. They must be designed to safeguard against data breaches, identity theft, and fraudulent activities. The incorporation of robust encryption, **authentication** protocols, and Risk detection frameworks ensure that every interaction remains secure, fostering trust and encouraging more users to rely on digital solutions for their travel needs.

Keywords - Travel Itinerary Planner, Artificial Intelligence, Personalized Travel Itineraries, Optimized travel itineraries, Real-time data Unification, Computational Linguistics, Cyber Security, Malicious Detection.

1. Introduction

In 2018, the number of trips in Indonesia reached 303.40 million, a 12.37% increase from 2017, driven by improved economic conditions and easier access to tourist destinations. Total expenditure also rose by 17.89%, reaching 291.02 trillion rupiahs, although inflation adjustments were not made. Indonesia's tourism continues to grow, driven by economic growth, rising purchasing power, and improved security, which increases domestic tourism. The rise of internet and mobile technologies has transformed customer behaviour, offering new experiences and simplifying processes like destination search, accommodation booking, and ticket purchasing. The process of planning and managing travel itineraries is crucial for enhancing the travel experience, whether for business, leisure, or exploration.

The proposed solution uses real-time data and advanced computational techniques to generate personalized travel itineraries. By factoring in key elements like travel time, destination, weather, group size, and budget, the app's algorithm creates customized plans that ensure seamless exploration and memorable experiences. In the fastchanging world of travel technology, the adoption of artificial intelligence (AI) has become a game-changer in improving the travel planning process. Traditional methods of organising trips often require extensive time and effort, involving the coordination of various services such as flight bookings, accommodations, and activity scheduling. Innovative solutions leveraging AI have been developed to streamline and personalise the travel planning process. These AI-powered applications utilise advanced machine learning algorithms and vast datasets to understand user preferences, optimise itineraries, and provide real-time updates, thereby offering a more efficient and tailored approach to trip organisation.

1. **Lack of Travel vehicle Booking:** Many travel planning apps do not provide seamless booking options for all types of transportation. While users can often book flights and hotels, the ability to book local transportation—such as rental cars, taxis, buses, or even private vehicles for intercity travel—is frequently absent. This leads to travellers needing to switch between different apps or platforms to complete their travel arrangements, disrupting the planning process.
2. **Inadequate Medicine / Healthcare Facilities:** Another critical issue is the absence of healthcare or emergency services integration within travel planning apps. There is often no easy way for travellers to access information about nearby hospitals, book ambulances, or receive emergency delays or confusion, which can significantly impact the traveller's safety and overall experience.
3. **Cyber Security Issues:** From a cybersecurity perspective, these apps face risks such as weak encryption, insecure payment gateways, and inadequate authentication methods, leaving user data vulnerable to breaches and unauthorized access. Poor privacy practices around personal data and location tracking can expose users to identity theft and misuse. Furthermore, inconsistent data

protection across different platforms increases the likelihood of cyberattacks. These security gaps must be addressed to protect user privacy and ensure safe transactions.

4. **Women safety:** Women and children travellers often face safety concerns during trips. There is a need for a travel planning app with integrated features like real-time tracking with cyber security, SOS alerts, and AI-based risk detection to ensure safe and secure journeys for women and children.

2. LITERATURE SURVEY

AI is transforming the tourism sector with personalized recommendations, dynamic pricing, and 24/7 customer support through chatbots, improving satisfaction and efficiency. AI technologies like sentiment analysis, image recognition, and fraud detection are enhancing security by detecting suspicious activities and preventing fraud. However, as AI collects more personal data, cybersecurity concerns arise, secure data storage, encryption, and privacy protections to prevent unauthorized access. Smart city tourism is also evolving with AI and big data, but this integration introduces risks around data privacy. Systems like Everywhere GPT and GT Planner streamline planning, but Cybersecurity protocols are crucial to protect sensitive information. Additionally, immersive AI tools like Street View enhance trip planning, but user data must be secured to avoid geolocation risks.

AI-based assistants and personalized models rely on secure authentication methods and encrypted transactions to protect traveller data. Crowdsourced apps like Personalized Trip Planning use location-based data, which must be safeguarded through secure communication protocols. As AI continues to shape travel, maintaining cybersecurity is crucial to ensure travellers' data remains safe from breaches and unauthorized access.

PAPERS USED:

Papers	Systems	System Goal	Techniques Applied
https://www.sciencedirect.com/science/article/pii/S2590005620300059#bib19	iTour	A Java-powered IoT platform designed to engage citizens in tourism growth	
https://www.sciencedirect.com/science/article/pii/S2590005620300059#bib24	CURUMIM	a tourism recommender system that uses data available on the Facebook social network, in order to offer personalized recommendation to its' users and	Content Based (CB) and Collaborative Filtering (CF) techniques to discard from whole set
		positively surprise them	
https://www.sciencedirect.com/science/article/pii/S2590005620300059#bib38	UTravel	a mobile app that utilizes user profiling in combination with context A datadriven system that directs individuals to points of interest based on their realtime location and past reviews using collaborative filtering techniques.	UTA algorithm [62]/ KMeans clustering algorithm
https://www.sciencedirect.com/science/article/pii/S2590005620300059#bib2	Find Tourist Profile	detects users' preferences implicitly, related to the location of social media photos	Deep Learning and Logic techniques

LITERATURE SURVEY:

title	Year	published	methodology	Algorithm	Accuracy	Drawback
AI in tourism Industry: An Overview of Reviews	2023	Administrative Sciences	Overview of Reviews Methodology	ANN, Support vector Regression	Enhanced Thematic insights into AI applications	Complexity of data and algorithmic bias
Role of AI in the Tourism Sector Improve	2022	International Journal of Creative Research Thoughts	Literature review and case studies	Predictive analytics, recommendation systems	Improved customer experience efficiency	Privacy concerns, and AI integration challenges
User experience.						
Travel Itinerary Planner Using AI	2024	International Research Journal of Engineering and Technology	Integration of AI and NLP techniques	NLP techniques, optimization	Tailored and optimized itineraries	Dependency on real-time data availability
Smart Travel Planner based on AI	2023	International Journal of Advanced Research in Science and Technology	Collaborative filtering and AI algorithms	Collaborative filtering	Increased user experience	Scalability issues with large datasets

3. PROPOSED SOLUTION:

The "Travel Itinerary Planner Using AI" is a comprehensive system that leverages cutting-edge Artificial Intelligence (AI) and Natural Language Processing (NLP) technologies to revolutionize the way users plan their travel journeys. This proposed system seeks to overcome the shortcomings of current travel planning systems by providing users with personalized and optimized itineraries that consider real-time data, transportation integration, and evolving user preferences.

The architecture of the Travel Itinerary Planner Using AI is designed to seamlessly integrate various components and enable efficient data flow throughout the system. The key modules and their functionalities are as follows:

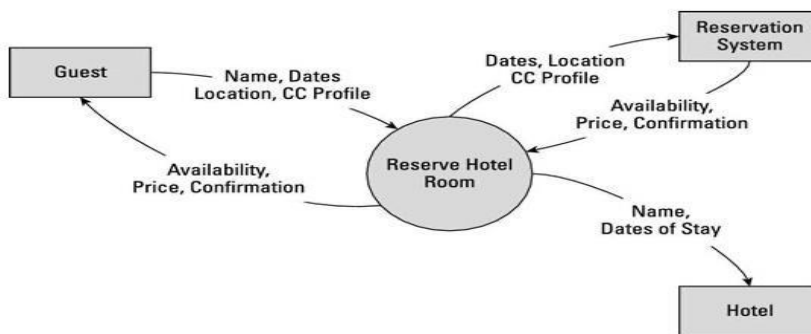
1. **User Account Administration:** This framework manages user sign-up, login verification, and account administration. ensuring secure access and personalized experiences for the users.
2. **Create a Trip Plan:** This module is the core of the system, where users can input their destination, trip duration. The system then processes this information and generates a comprehensive travel itinerary. It will provide budget constraints, and desired activities.

4. METHODOLOGY

4.1 SYSTEM DESIGN:

Fundamental Models: To further represent the system's functionality and design, we have developed several fundamental models, including:

1.Data Flow Diagrams (DFDs):



The DFDs, depict the flow of data within the system, showcasing the key processes, external entities, and data stores involved in the travel itinerary planning.

2. Unified Modelling Language (UML) Diagrams:

-Use Case Diagram: Illustrates the interactions between the user, the Travel Planner, and the API, highlighting the system's core functionalities.

-Activity Diagram: Outlines the sequential flow of actions in the Travel Planner system, from user input to itinerary generation and feedback.

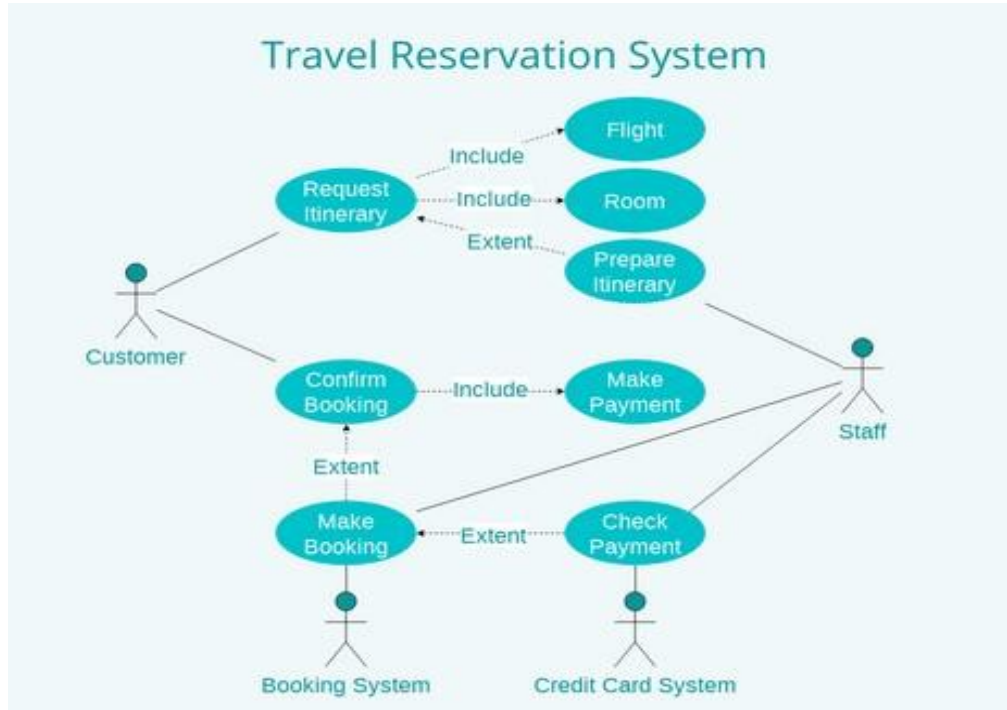
-Sequence Diagram: Presents the dynamic interactions among the user, Travel Planner, and API over time, demonstrating the chronological order of actions.

-Component Diagram: Breaks down the system into modular components, including the User Interface, Back-end Server, and external integration.

-Deployment Diagram: Depicts the physical deployment of the system components across devices, showcasing the distribution of the User Interface and Back-end Server.

These fundamental models Offer a thorough insight into of the proposed Travel Itinerary Planner Using AI, its architectural design, data flow, and the integration of various technologies to deliver a seamless and innovative travel planning experience for users

4.2 SYSTEM ARCHITECTURE



The AI-driven travel planner app utilizes collaborative filtering and advanced recommendation techniques for journey planning and hotel reservations. To use the app, users must first sign up or log in, ensuring customized recommendations based on their preferences. The system is designed with two primary layers: journey planning and hotel booking, both powered by a central recommendation engine that analyses user interests and reviews to suggest suitable destination. Additionally, the app features a search function that allows users to explore popular locations, determine the best routes, and utilize mapping tools for navigation and direction guidance. Once the journey is finalized, users receive personalized recommendations. A search box is also available for finding various locations, including famous landmarks, with integrated mapping and route optimization features to assist in reaching their desired destinations efficiently.

Journey Planning –

This is the initial module of the AI-powered smart travel planner app. Once the user makes a selection, they will be prompted to input their desired destination, and relevant details will be provided accordingly. The user must decide the duration of the trip Regarding the quantity of days. If they cannot find a suitable option, a search feature allows them to explore various destinations. Within the search box, Users can utilize features they are maps and navigation assistance. Additionally, they can look up popular tourist spots and determine the best routes to reach them efficiently.

Accommodation Facility: Once the journey is planned and the destination along with the travel dates are confirmed, the user can proceed to the next module—hotel booking. If the user resides in the same city and is visiting nearby locations, this step can be skipped. However, for those traveling to a different city, finding suitable accommodation becomes essential. The user can either choose from the recommended hotels or search for options manually. Before finalizing the booking, the system will check room availability and display the associated costs. Once a hotel is successfully booked, the reservation details will be shown to the user.

Women and children Safety Features:

Develop a travel app with built-in safety features like live location sharing, panic/SOS button, geo-fencing alerts for unsafe areas, AI-based risk prediction, verified accommodations and transport, and emergency contact access. These features will provide real-time protection and peace of mind for women and children doing travel.It includes:

1. Real-time Location Tracking and Sharing
2. Encrypted Emergency Contact Storage and anomaly detection
3. AI-based Risk Detection and secure payment gateways
4. Access Control for Kid's profiles and Regular Security and incident updates.

4.3 METHODOLOGY REVIEW

4.3.1 Data collection & Integration

The efficient collection and integration of information from needed sources, including travel booking platforms, review sites, and local event databases. By employing APIs and web scraping techniques, the app gathers comprehensive and real-time information about flights, accommodations, and attractions. Data integration platforms and data warehouses then centralize this information, ensuring accurate and cohesive data that supports seamless user interactions and up-to-date travel recommendations.

4.3.2 Real-Time Analytics

Real-time analytics are crucial for the app's responsiveness and accuracy. The app leverages stream processing technologies to analyse live data, including flight statuses, weather conditions, and traffic updates. It ensuring users receive the most current and relevant travel guidance

4.3.3 Cloud Computing and Scalability

Cloud computing provides the infrastructure Essential for the app to handle huge volume of data and scale effectively. Utilizing cloud services such as AWS, Google Cloud, or Azure allows the app to manage and process data efficiently while ensuring high availability and performance. Microservices architecture supports scalability and flexibility, enabling the app to grow and adapt to increasing user demands and data volumes.

4.3.4 Data Protection

providing data privacy and security is a priority for the app. Encryption protects user data both in transit and at rest, while access controls limit data access based on user roles. Data protection regulations such as GDPR and CCPA is maintained to safeguard user information and build trust, ensuring that the app adheres to legal requirements and moral principles.

4.3.5 Machine Learning and Personalization

Both ChatGPT and Gemini incorporate advanced machine-learning techniques to continuously refine their performance and adapt to user interactions. ChatGPT utilizes reinforcement learning from human guidance (RLHG) to increase its efficiency over period, while Gemini employs similar methodologies to enhance conversational capabilities.

4.3.6 Review of Datasets

The Dataset organized for the trip planner needed to provide a effective foundation for generating personalized travel recommendations. Travel itineraries: This includes detailed schedules for flights, accommodations, and activities. You can obtain the information from travel booking sites, sample datasets on platforms like Kaggle, or APIs from providers such as Expedia or Booking.com. Having access to diverse itineraries allows the AI to offer personalized travel plans based on user preferences.

TECHNIQUES AND TECHNOLOGIES

The system can be divided into three part:

A. Trip Planner Engine

This engine is used to generate itinerary based on people choices. We implement clustering algorithm to create object destination recommendation. Object destination data is stored in database and accessed to create itinerary.

B. Database

On this simulation, we create two tables for saving the data as shown in Table below.

TABLE I. POI DESTINATION TABLE

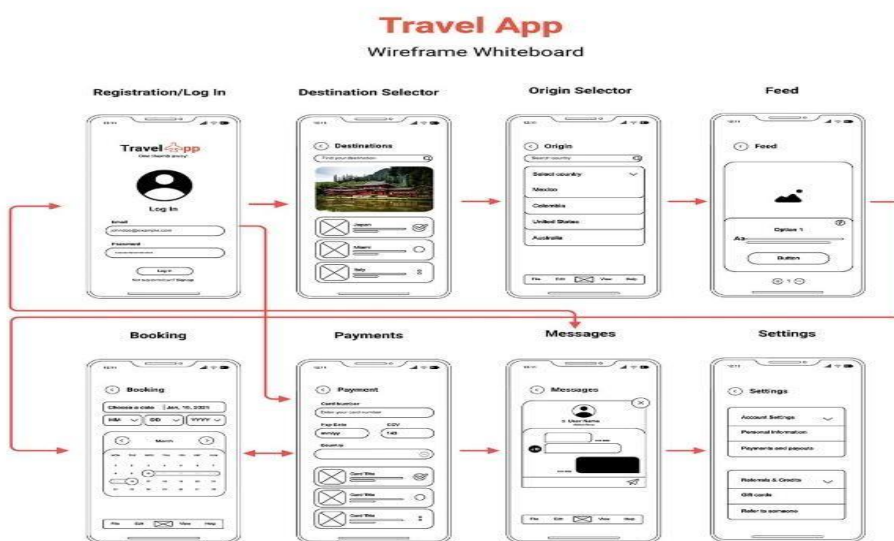
Fields	Type	Comment
Id	Int	Pk
Destinasi	Varchar	
Deskripsi	Text	

Points	LongText	
Center	Text	
Maps	Text	
Status	TinyText	
Kategori	Int	Fk

C. User Interface

Interface which is used by user to create a request. We provide web and mobile user interface.

4.4 IMPLEMENTATION APPROACH



1. User Input:

The Google Places Autocomplete Application Programming Interference (API) was used to collect location data and suggestions based on user input. Based on the information received, OpenAI's Large Language Model API to generate natural language writing was utilized. When users enter their preferred source and destination locations, the autocomplete feature dynamically provided location choices based on real-time data. Fig shows a glimpse of the API's implementation. Users can use this function to quickly and precisely select their preferred starting and ending points for their journey path. In addition, the number of travel days and the user's budget are considered.

2. Itinerary Generation

The system leverages the power of ChatGPT's large language model Davinci-003 via API, which allows to generate dynamic and interactive conversations.

- Prompt Engineering –Prompt engineering entails meticulously developing the input prompt to direct the model's behaviour and produce desirable out-comes. The prompt includes information such as starting and ending points, number of days, budget, and personal choices such as sites, activities, or restaurants.
- Interaction with the ChatGPT API – The Itinerary Generator has a conversational interaction with the ChatGPT API. The user enters their travel choices into a userfriendly interface, and these inputs serve as prompts to initi-ate a conversation with the ChatGPT model. Based on the prompt, the Davinci-003 model provides a response..
- Testing and Iteration– Extensive testing and iteration are carried out to assure the Itinerary Generator's quality and efficacy. Determining the accuracy and usefulness of recommendations, and asking user feedback for future enhancements. Based on user input and performance evaluation, the system is constantly modified, allowing for iterative improvements to the itinerary development process.

3. Data Collection

To obtain airline and hotel data from the Travel Google site, Playwright web scraping tool was utilized. Information such as flight schedules, rates, airlines, and travel duration, as well as hotel names, reviews, pricing, and facilities could be obtained. This data collection procedure ensured that the Itinerary Generator provides users with up-to-date and accurate travel planning information. To collect flight data, our script extracts all flight info from Google Flights, upto 200-300 rows of data. For hotels, 100-150 rows of data was extracted, which is comparable to upto 5 pages, each with 20 hotels. While having a dynamic script to extract all hotel data, the extraction engine takes half an hour to execute and extract all of the data, therefore it was decided to scrape sample data for efficiency.

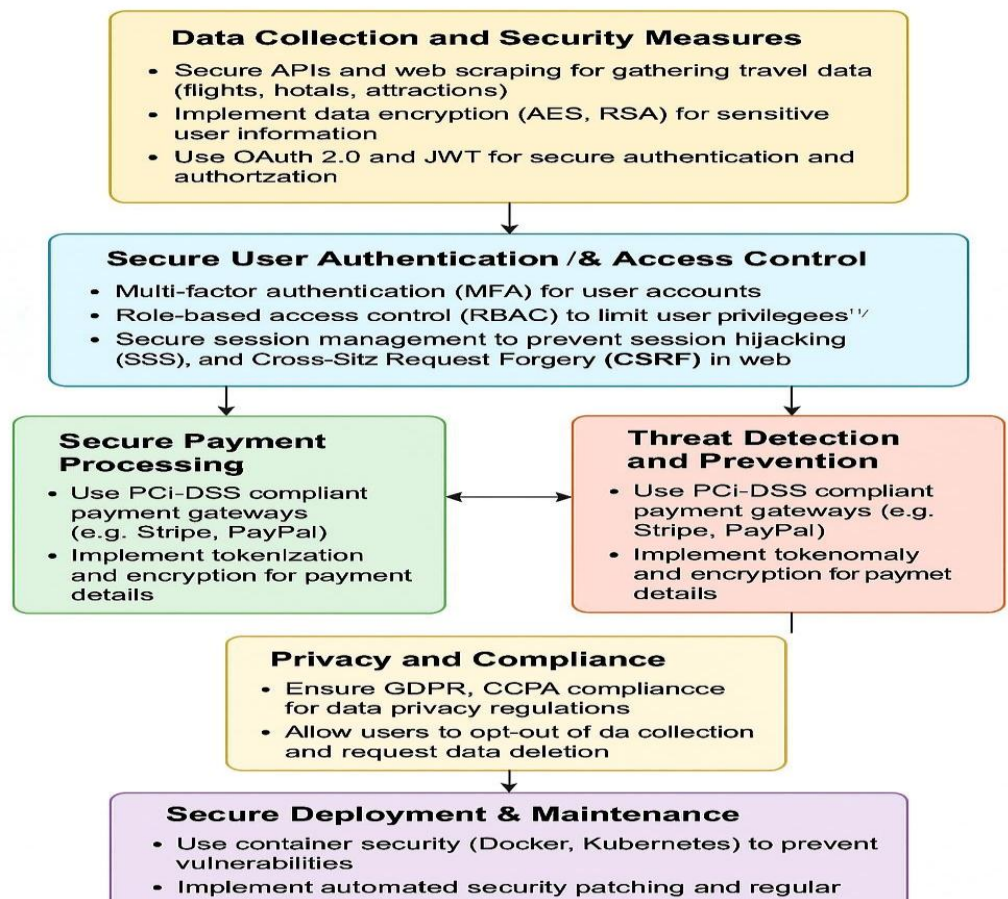
4. Data Preprocessing

To make the airline and hotel information ready for the recommendation engine after obtaining it from the Travel Google website, data preprocessing was performed. The data had to be cleaned, transformed, and organized in a number of processes. The data formats were then standardized, including the formatting of dates and prices. Additionally, to standardize the numerical characteristics' scale, data normalization techniques were empowered. Finally, pre-processed data was organized in a way that the recommendation engine could use it efficiently. These preprocessing procedures improved the flight and hotel data quality and usefulness, allowing the recommendation engine to produce precise and personalized choices for the users' trip schedules.

5. Content Based Recommendation Engine

A content-based recommendation engine is a type of recommendation engine that recommends items to users relative on the similarity of the attributes or features. Attributes such as destination, pricing, amenities, user ratings, and other characteristics that could impact user choices were among these aspects. The recommendation engine could better comprehend the characteristics of flights and hotels and match them to user preferences by extracting and arranging these features. In the implementation, first step is to load flight and hotel data into a Pandas dataframe. Then create methods for recommending flights with comparable features based on cosine similarity and identifying the cheapest flights based on both similarity and price. Defining a set of "features" entails grouping important columns and translating them into feature vectors with the Term Frequency -Inverse Document Frequency (TF-IDF) vectorizer. Following that, a cosine similarity matrix is constructed to determine the similarity between several flights. Finally, users are presented with reliable and cost-effective flight recommendations that are tailored to the unique tastes, thanks to this approach. Fig shows the recommendations given by the engine as per the user needs.

4.5 CYBER SECURITY APPROACH



1. Data Collection & Security

- **How data is gathered:** We use secure APIs and safe web scraping to collect information like flights, hotels, and attractions.
- **How it's protected:** Personal details (name, email, preferences) are encrypted using strong algorithms like AES (fast and secure) and RSA (for sharing data safely).
- **Login safety:** We use OAuth 2.0 and JWT to make sure only authorized users can log in securely.

2. User Login & Access Control

- **Extra login protection:** Multi-factor authentication (MFA) sends a code to your phone/email to verify it's really you.
- **Access restrictions:** Role-based access control (RBAC) means users only see what they're supposed to (admin vs. regular user).
- **Session safety:** Sessions are managed securely to prevent hackers from stealing your login info.

3. Threat Detection

- **Monitor for intrusions:** Systems constantly watch for suspicious behavior using Intrusion Detection Systems (IDS).
- **Smart threat detection:** AI-based anomaly detection alerts the team if something looks odd or dangerous.
- **Web safety:** Protections against common attacks like SQL Injection, XSS, and CSRF keep the web interface secure.

4. Safe Payment Processing

- **Trusted gateways:** Payments go through safe, certified platforms like Stripe or PayPal (PCI-DSS compliant).
- **Data safety:** Your card info is tokenized (turned into a code) and encrypted so even if breached, it's useless to hackers.

5. User Privacy & Regulations

- **Legal compliance:** The app follows laws like GDPR and CCPA that protect user privacy.
- **User control:** Users can opt-out of data tracking or ask for their data to be deleted at any time.

6. Secure App Deployment

- **Secure containers:** We use tools like Docker and Kubernetes to deploy the app securely.
- **Automatic updates:** Security patches are applied regularly to fix any weaknesses.
- **Secure connection:** HTTPS, SSL/TLS encrypts all data during communication to prevent spying.

4.6 ALGORITHMS USED:

1. Algorithm for Women and Children Safety (SOS with Geofencing + AES Encryption):

Algorithm: SafeZone SOS Alert System

Goal: Monitor user location and trigger secure SOS if user exits safe zone or presses panic button.

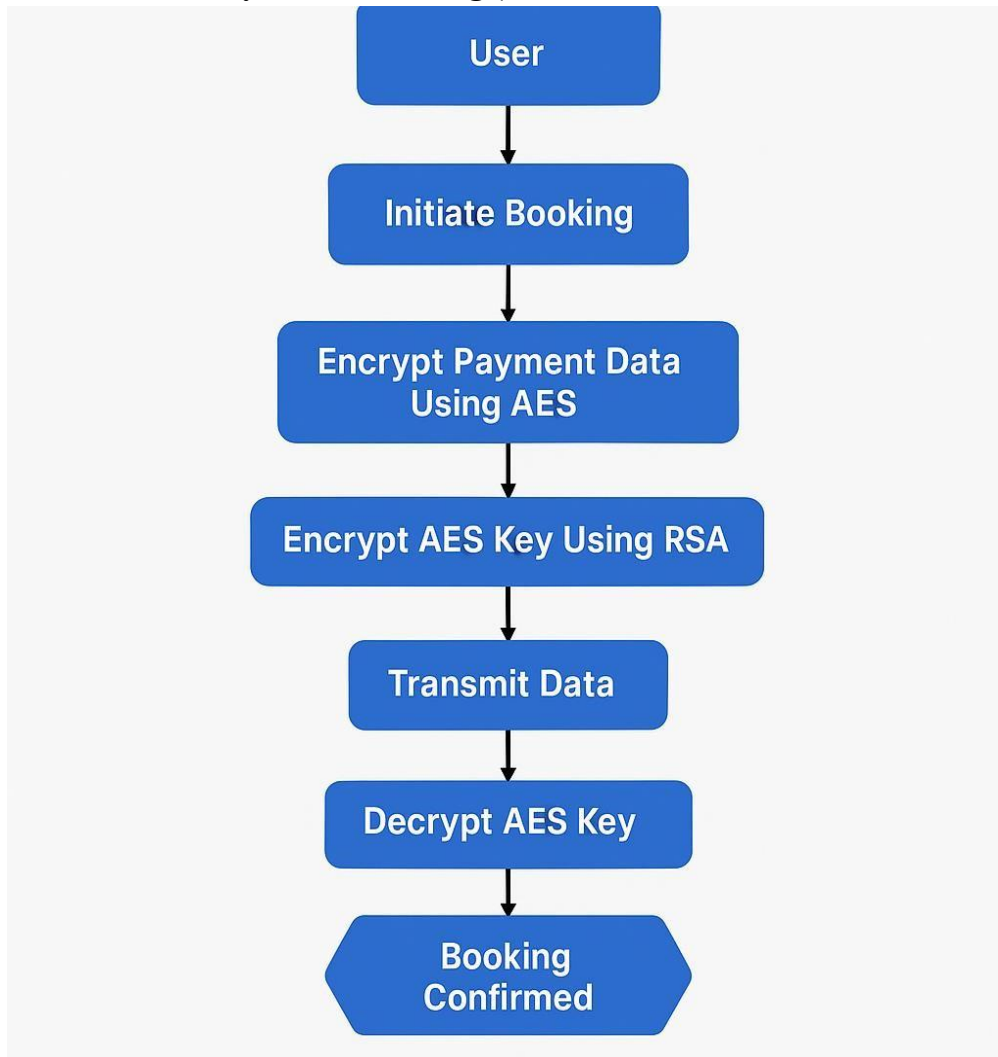
Steps:

1. Initialize Safe Zone Coordinates (Geofence) `safe_zone = (latitude, longitude, radius)`
2. Monitor User Location Continuously Every few seconds: `→ current_location = getUserGPSLocation()`
3. Check for Breach `→ If distance(current_location, safe_zone.center) > safe_zone.radius: → Call triggerSOS()`
4. Trigger SOS on Panic Button or Geofence Breach `→ Create message:
msg = "User ID:123, Location:XYZ, Time:Now"`
5. Encrypt SOS Message with AES `→ encrypted_msg = AES.encrypt(msg, secret_key)`
6. Send Encrypted SOS to Emergency Server `→ sendToEmergencyServer(encrypted_msg)` Notify Guardians and Local Authorities

Key Technologies:

1. GPS API for location
2. Haversine Formula for distance
3. AES for encryption
4. Firebase/Socket server for live alert

2. Algorithm for Secure Payment & Booking (AES + RSA +



Tokenization)

Algorithm: Secure Booking and Payment

Goal: Securely process payment while booking hotel/transport.

Steps:

1. User Initiates Booking → Input: destination, dates, card details
2. Tokenize Card Details → token = tokenize(card_number, expiry_date)
3. Encrypt Tokenized Data with AES → encrypted_data = AES.encrypt(token, aes_key)
4. Encrypt AES Key with RSA → encrypted_key = RSA.encrypt(aes_key, server_public_key)
5. Send Encrypted Data to Payment Server → send(encrypted_data, encrypted_key)
6. Server Decrypts AES Key using RSA Private Key → aes_key = RSA.decrypt(encrypted_key, server_private_key)
7. Server Decrypts Tokenized Data → token = AES.decrypt(encrypted_data, aes_key)
8. Payment Gateway Processes the Token → process(token)

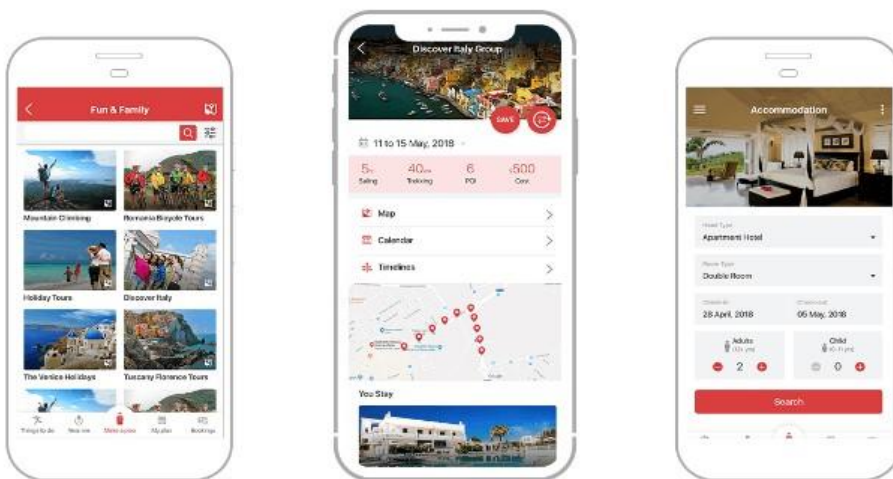
9. If Payment Success → Confirm Booking → Send success message to user.

Key Technologies:

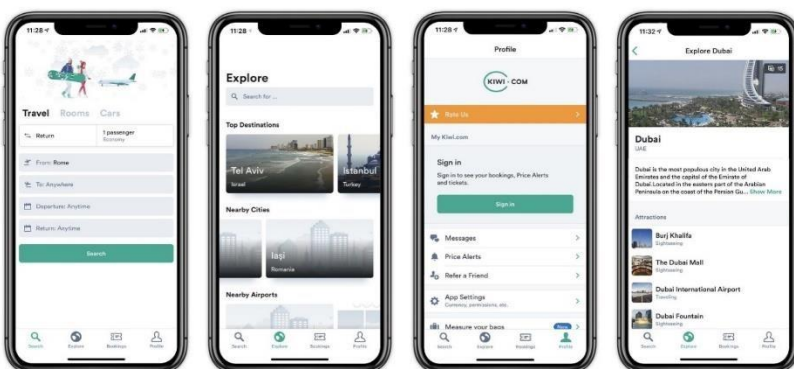
1. AES for fast symmetric encryption
2. RSA for secure key exchange
3. Tokenization to hide card details
4. TLS (HTTPS) for transmission

5. RESULTS

This paper describes about the Travel Planner app based on AI integrated with cyber security how it makes travelling journey easy for the travellers as well as save there time by providing various features for journey planning. An AI-Base Intelligent System that Assist Travelers Planning For Their Trips By Providing Them With A Single Application With A Unified Interface For Accessing Amount Of Travel-Based Information Scattered Throughout The Internet And Also Enables To Create Itineraries, Calculate Routes And Block Personal Time Slots.



VISITING PLACES DETAILS

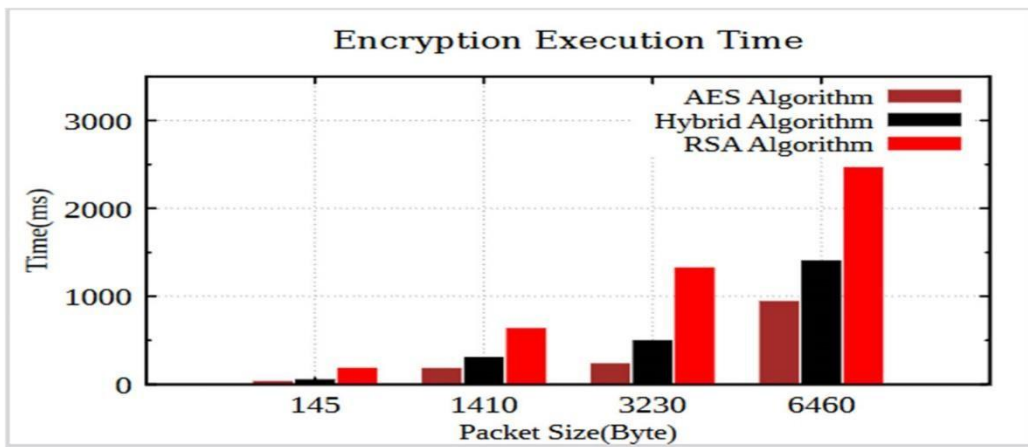


FLIGHT BOOKING



HOTEL DASHBOARD

Size(Bytes)	AES	RSA	Hybrid
145	32	180	49
1410	177	630	302.9
3230	230	1323	493.5
6460	940	2465	1401



AES and RSA Algorithm working Graph Statistics

6. FUTURE WORKS AND CONCLUSION

As we are extending our work in future by providing more features in calculating route, traffic etc.. We also aim to port this application to a mobile platform by providing security in payment process, Thread detection and prevention, User authentication and authorization. In this case, GPS information from the mobile device may be used to determine the user Information relevant to his current context. Since the performance of any performance of any application can be improved by storing static data in a local database avoiding the need for constantly refreshing this information, other optimizations can be applied to enhance the system's performance. As many performances of any applications can be improved by storing static data in a local database avoiding the need for constantly refreshing the information and we will thoroughly examine our system to determine locally stored and also explore.

TOPIC	DETAILS
Improved Recommendation Engine	The recommendation system improves from user feedback and behaviour over time.
Integration of Social Media Networks	The product can leverage social media data adding a social dimension to itineraries.
Data Extraction	More data can be extracted from various travel sites like Expedia, and Booking.com.
Real-time Data Integration	Including real-time data sources such as weather forecasts would improve the tool's timeliness and accuracy.
Booking System	Combining direct booking features for flights, hotels, and transportation.

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