
Guide Me Right

Navigating Your Personalized Tour

By

Saikat Hossain (011201214)
Santi Brata Nath (Joy) (011201230)
Md. Shamim Bin Nur (011191092)
Nazmul Hoda (011201224)
Md. Mehedi Hassan (011201205)
Lailafin Nahar Tithy (011201332)

Submitted in partial fulfillment of the requirements
of the degree of Bachelor of Science in Computer Science and Engineering

January 29, 2024



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
UNITED INTERNATIONAL UNIVERSITY

Abstract

In the realm of modern travel, the process of planning and executing personalized journeys is fraught with challenges such as destination selection, itinerary creation and budget management. In response to the complexities faced by modern travellers in planning and executing their journeys, in this thesis, we have introduced a pioneering solution: a personalized travel assistant application that harnesses artificial intelligence and data analysis. Let us assume a situation, where a traveller wants to get a relevant tour planning guide, unfortunately, users do not get that solution expect booking and storytelling. Our research showcases the potential of this innovative platform, that offers tailored recommendations, efficient itinerary planning and seamless integration with travel services. By analyzing user preferences, our system generates optimized routes, curated suggestions and real-time insights, revolutionizing the travel experience. The significance of this thesis lies in its ability to alleviate the challenges of conventional travel planning, empowering users to make informed decisions, optimize their time and resources and embark on enriched journeys. We have also added an expense tracker and real-time weather update. Further, we have developed a better solution for the service providers, a streamlined platform that enables them to effortlessly showcase their offerings, connect with a wider audience and benefit from an expanded online presence. Service providers can effectively manage bookings, promote their services and interact directly with travellers, thus enhancing their business opportunities and facilitating efficient customer engagement. This thesis contributes to the evolution of the tourism industry by bridging the gap between travellers and service providers, fostering a more collaborative, efficient and satisfying travel ecosystem.

Acknowledgements

Gratitude and appreciation are extended to the Supreme Being of compassion and kindness. May peace and blessings envelop all messengers, especially the last and ultimate ones. This work would not have been possible without the input and support of numerous individuals over the past trimester. Our heartfelt thanks go to everyone who contributed in various capacities.

Foremost, we express our gratitude to our academic advisor, Associate Prof. Dr. Suman Ahmmed, for his valuable time and guidance throughout the trimester.

We also extend our thanks to our fellow thesis members, whose dedication and hard work greatly contributed to the completion of the thesis.

Lastly, we owe a debt of gratitude to our families, including our parents, for their unwavering love and significant emotional support.

Table of Contents

Table of Contents	iv
List of Figures	v
List of Tables	vi
1 Introduction	1
1.1 Project Overview	1
1.2 Motivation	2
1.3 Objectives	2
1.4 Methodology	2
1.5 Project Outcome	3
1.6 Organization of the Report	4
2 Background	6
2.1 Preliminaries	6
2.2 Literature Review	8
2.2.1 Related Research	8
2.2.2 Similar Applications	10
2.3 Gap Analysis	12
2.4 Summary	13
3 Project Design	14
3.1 Requirement Analysis	14
3.1.1 Functional Requirements	14
3.1.2 Nonfunctional Requirements	15
3.2 Objectives	16
3.2.1 Context Diagram	16
3.2.2 Data Flow Diagram (DFD)	17
3.2.3 UI	18
3.3 Detailed Methodology and Design	20
3.4 Project Plan	21
3.5 Task Allocation	23

3.6 Summary	25
4 Implementation and Results	26
4.1 Environment Setup	26
4.2 Implement Feature	27
4.3 Results and Discussion	31
4.4 Summary	31
5 Standards and Design Constraints	32
5.1 Compliance with the Standards	32
5.1.1 Software Standards	32
5.2 Design Constraints	34
5.2.1 Economic Constraint	34
5.2.2 Ethical Constraint	34
5.2.3 Social Constraint	34
5.2.4 Sustainability	35
5.3 Sustainable Development Goals (SDGs)	35
5.4 Cost Analysis	36
5.5 Complex Engineering Problem	36
5.5.1 Knowledge Profile	36
5.5.2 Complex Problem Solving	38
5.5.3 Engineering Activities	39
5.6 Summary	40
6 Conclusion	41
6.1 Summary	41
6.2 Limitation	41
6.3 Future Work	41
References	46

List of Figures

1.1	Problem Statement Big Picture	1
1.2	Guide Me Right Logo	4
3.1	Context Diagram	17
3.2	Data Flow Diagram	17
3.3	Home Page	18
3.4	Home Page Search	18
3.5	Preference Selection	19
3.6	Trip Plan	19
3.7	System Workflow	20
3.8	Algorithm working Method of Place Recommendation	21
3.9	Project Plan for FYDP-01	22
3.10	Project Plan for FYDP-02	22
4.1	Dataset	27
4.2	Algorithm part-1	28
4.3	Algorithm part-2	29
4.4	Algorithm part-3	29
4.5	Algorithm part-4	30
5.1	Software Development Life Cycle	33

List of Tables

2.1	Comparative Analysis 01	12
2.2	Comparative Analysis 02	13
3.1	Task Allocation 01	23
3.2	Task Allocation 02	24
5.1	Budget	36
5.2	Mapping with Knowledge Profile	36
5.3	Mapping with complex problem solving	38
5.4	Mapping with complex engineering activities	39

Chapter 1

Introduction

The chapter contains a brief overview of the project along with the purpose of the thesis, motivation, objectives and project outcomes.

1.1 Project Overview

The tourism sector has experienced remarkable growth in the last few years [1], with people travelling for vacations, business and exploration. However, travellers encounter difficulties when planning their trips and choosing their comfortable and nearby accommodation [2]. Existing travel resources have limitations in providing up-to-date personalized information. In addition, the resources offer a wide range of information that often causes travellers to find relevant information and also causes a higher budget.

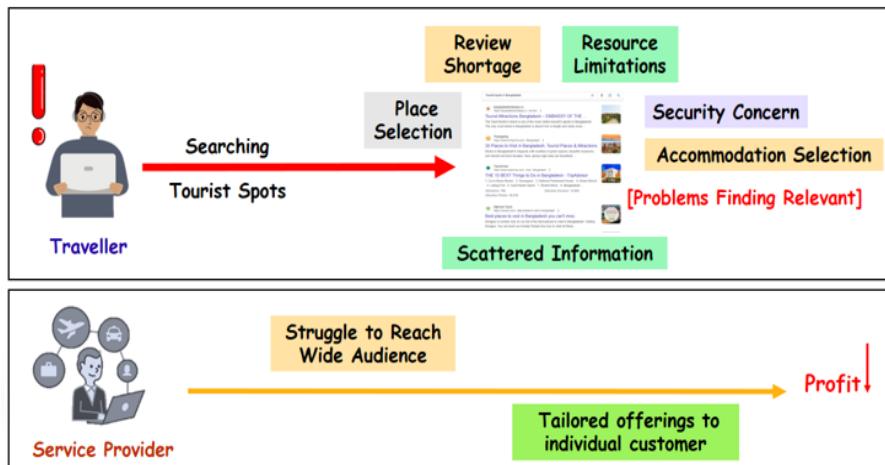


Figure 1.1: Problem Statement Big Picture

To address these challenges, Guide Me Right has been developed to enhance the travel experience by resolving the needs. Firstly, Our application can deliver personalised recommendations for destinations, attractions, accommodations, local events, budget and tour planning guides by leveraging user preferences, data and intelligent algorithms. In addi-

tion, travellers can save time in planning, make informed decisions and create customised travel experiences that align with their preferences. Secondly, our system has worked for service providers' profit maximization. They can effectively enhance their business opportunities and facilitate efficient customer engagement.

1.2 Motivation

Thus, we understand that time is a valuable commodity and everybody wants to travel on a budget, our application aims to save time on preferences [3] and expenses by suggesting optimal accommodation. Furthermore, we offer an intelligent recommendation system to assist travellers in selecting tourist spots because most people do not find accommodation according to their wishes [4]. In addition, around 40% of people want to travel to the destination according to the affordability of accommodations [5]. Finally, our application system can consider travellers' preferences as prompts and provide them with a personalised result. Also, service providers can reach more travellers and extend their business.

1.3 Objectives

1. To develop a personalized recommendation system: Introducing an algorithm that analyzes the traveller's interests and preferences to provide tailored recommendations for places to visit, hotels to stay in and activities to experience.
2. To provide comprehensive and up-to-date information: Extensive information about tourist destinations, including details about attractions, accommodations, transportation options, local services, weather updates and security information. Ensure the information is accurate, reliable and regularly updated to provide the most current details to the users.
3. To enhance the user experience through a user-friendly interface: Designing an intuitive and user-friendly interface that allows travellers to easily navigate and access the application's features, a visually appealing design and intuitive user interactions to ensure a positive user experience.
4. For multiple Sub-places nearest Accommodation Recommendations based on Preferences: To provide nearby accommodation according to the preference and budget.
5. Provide service providers to engage more customers.

1.4 Methodology

Guide Me Right is a comprehensive travel application designed to assist travellers in Bangladesh while also offering significant benefits to service providers in the tourism in-

dustry. It provides travellers with personalized recommendations, cost-saving tips, and detailed destination information, addressing challenges related to expenses and limited knowledge about tourist spots. Simultaneously, it offers service providers a unique platform to showcase their offerings, connect with potential customers, and promote their services effectively. By bridging the gap between travellers and service providers, Guide Me Right contributes to the growth of the local tourism industry and fosters a mutually beneficial ecosystem.

While researching for our project we have divided our concern into two divisions problem study and solution analysis. In the problem study, we reviewed benchmark products, research papers and survey data. Around 25 research papers [6] have been reviewed to clarify our topic. After analyzing the problems next part is to analyse the solutions. In the research paper part, our main goal is to know how tourist psychology works, how a travel route recommendation algorithm works and finally how to develop an intelligent system to suggest optimal paths. After that, to cope with the current products we reviewed 15 benchmark products to justify the solutions we are expected to provide. A survey has been taken to two groups named travellers [7] as users and service providers [8]. Both groups needed to answer 16 questions. Finally, a gap analysis was done. The main features have received positive reviews from the survey analysis. Then a comprehensive project plan was developed to follow throughout the development journey. After that, the system workflow was developed with the consideration of three stakeholders admin, user and service providers.

With the help of the project plan, the implementation has developed. At first, we have fixed which features we are expecting to develop and which types of challenges we could get. Thorough research has taken to meet the challenges. After fixing the features, we also fixed our requirements like Django, HTML, CSS, Bootstrap, NLP, API (Weather, Bing Map), VS Code and Git. All the algorithms have been initialised with the concept. Finally, the implementation part was developed with every member selecting different parts. While implementing, limitations and future scope also got fixed.

1.5 Project Outcome

The outcome of Guide Me Right is a fully functional and user-friendly application designed to serve as a personalized tourist guide. First, it aims to enhance tourists' travel experiences by providing accurate recommendations, comprehensive information and efficient navigation assistance based on their preferences and interests. Second, it allows users to create personalized profiles where they can input their preferences, interests and travel goals. This information serves as the basis for generating customized recommendations and itineraries. Third, our project aims to revolutionize the way tourists explore unfamiliar destinations by providing them with personalized, reliable and user-friendly guides.

The successful implementation of this project significantly enhances the travel experience for tourists worldwide, fostering cultural exchange and promoting sustainable tourism.



Figure 1.2: Guide Me Right Logo

1.6 Organization of the Report

The total report is divided into six chapters. We have mentioned every particular chapter's details below.

- Chapter 2, the background section, encompassing essential preliminaries, exploring similar applications, delving into relevant research and conducting a comprehensive gap analysis.
- Chapter 3, we delve into the project design, uncovering the intricate web of functional and non-functional requirements. We unveil the project's context diagram and illuminate the data flow diagram. Furthermore, we embark on a journey through the UI design, delve into the intricacies of the detailed methodology and design, chart out a meticulous project plan and strategically allocate tasks.
- Chapter 4, the arena of implementation and the unveiling of results. It involves the meticulous setup of the project environment, a rigorous testing regimen, a discerning evaluation of the outcomes and an insightful discussion of the results obtained.
- Chapter 5, we explore the realm of standards and design constraints. We meticulously examine compliance with pertinent standards, navigate through the intricacies of design constraints, delve into comprehensive cost analysis and confront complex engineering challenges that surfaced during the project's course.
- Chapter 6, we draw the curtains on our project with a comprehensive conclusion. Within this chapter, we encapsulate the entirety of our report, presenting a concise summary of its key aspects. We also candidly acknowledge the project's limitations,

shedding light on areas that warrant further improvement and refinement. Moreover, we set our sights on the horizon, outlining avenues for future work and research. Also ensuring that our project's legacy extends beyond this chapter's confines.

Chapter 2

Background

In this chapter, we have explored the background information essential for grasping the main idea. Following that, we have presented a comprehensive overview of existing research. This review of literature is structured into two distinct parts: one research paper analysis and the other relevant benchmark products analysis. Ultimately, we have conducted a thorough examination of these works, uncovering discernible gaps, which we've outlined within the literature review segment.

2.1 Preliminaries

To comprehend the significance and context of the presented project, it is essential to have a foundational understanding of the challenges encountered by travellers in contemporary travel planning. The modern travel landscape is characterized by a growing desire for personalized and enriching experiences. However, the process of planning a trip encompasses multifaceted challenges, including destination selection, itinerary creation and budget management. These complexities can often overshadow the excitement of travel and lead to decision fatigue.

- Destination Selection: Travelers often face the challenge of choosing an ideal destination that aligns with their interests, preferences and available time. The sheer variety of options, coupled with the desire for a unique and rewarding experience, can make destination selection overwhelming and time-consuming. Factors such as weather, culture, activities and accessibility play a role in this decision-making process.
- Itinerary Creation: Crafting a well-structured itinerary involves strategically planning the sequence of activities, attractions and experiences during a trip. Travellers need to balance their interests, allocate time efficiently and account for logistics such as transportation and distances between attractions. Developing an itinerary that maximizes enjoyment while avoiding overcrowded or rushed schedules can be complex and requires careful consideration.

- Algorithmic Understanding: Algorithms are systematic sets of rules that computers follow to solve problems or perform tasks. In the context of travel recommendations, algorithms analyze user preferences and historical data to generate personalized suggestions for destinations, accommodations, activities and more.
- User Interface and Experience: User interface (UI) refers to the visual elements users interact within an application, while user experience (UX) focuses on users' overall interactions and feelings. Both UI and UX are crucial for creating user-friendly travel apps that provide seamless access to recommendations and planning tools.
- API Integration: API integration allows different software systems to communicate and share data seamlessly. In travel apps, APIs enable interactions with booking services, providing users with real-time information and options.
- Database: Databases store and organize data for retrieval and analysis. For travel apps, databases hold user profiles, preferences and travel histories, enabling the app to offer personalized recommendations and manage user data securely.
- Privacy and Security Awareness: In the digital age, safeguarding user data is paramount. Ensuring user data privacy while offering personalized recommendations involves implementing secure data storage and transmission protocols.
- User-Centric Design: User-centric design focuses on creating products that cater to users' needs and preferences. In travel apps, this means designing interfaces and features that enhance the travel experience by providing relevant, accessible and intuitive tools.
- Data Analysis: Data analysis involves examining data to extract meaningful insights. In travel apps, data analysis helps refine recommendations by identifying user preferences and patterns.
- Travel Industry: Understanding the travel industry landscape, challenges and user expectations is crucial for developing effective travel apps. Incorporating technological solutions into travel aligns with industry trends and the growing demand for personalized experiences.
- Data Preprocessing: Before applying algorithms, data often needs to be cleaned, transformed and prepared. This process, known as data preprocessing, ensures that the data is suitable for analysis and helps improve the accuracy of recommendations.
- Real-time Data: For features like safety updates and weather forecasts, integrating with real-time data sources is essential. Understanding how to retrieve and incorporate real-time data is crucial for up-to-date and relevant recommendations.

- User Feedback: Incorporating user feedback is important for refining recommendations. Understanding how to collect, analyze and implement user feedback can help improve the system over time.
- Localization and Internationalization: For travel apps serving users from different regions, understanding localization (adapting content for different languages and cultures) and internationalization (designing the app to be easily adapted to different regions) is crucial.

2.2 Literature Review

In this section, we have conducted a literature review to establish the context, identify gaps and evaluate the effectiveness of personalized travel recommendation systems.

2.2.1 Related Research

Xi Cheng et al. [9], the author introduces a novel travel route recommendation algorithm to address accuracy limitations in traditional methods. By leveraging users' historical travel patterns and preferences for interest themes and distances, the algorithm computes optimal routes while considering constraints. Experimentation on a **Flickr** dataset demonstrates its superiority over approaches focusing solely on themes or distances. The paper highlights *complexities in tourism product recommendation* and uses real web server logs for precise user interest capture. It outlines creating a Points of Interest correlation graph from shared photo data, factoring in time and category attributes for user interest. The algorithm aims to maximize cumulative route scores within time as an orienteering problem.

Jing Lu et al. [10], the author proposes a method for precise tourist attraction recommendations using **Microblog** data and machine learning to address sparse data and low accuracy in existing tourism recommendation research. This approach extracts comprehensive tourism factors and incorporates contextual information like travel time and season to better understand user preferences. To counter sparse data and cold start issues, the paper introduces *deep learning algorithms* and combines them with multi-feature tourism factors, resulting in dynamic scenic spot prediction models. Experimental results show the superiority of the "*random forest preferred attraction prediction (RFPAP)*" and "*neural networks preferred attraction prediction (NNPAP)*" methods, with RFPAP achieving stronger generalization and 89.61% accuracy compared to NNPAP's 89.51%.

Zhixue Liao et al. [11], authors propose that in the postmodern tourism era characterized by tailored experiences, tourist behaviour has undergone significant changes. To enhance travel experiences and attraction success, personalized routes are crucial. This study introduces an **RS-H2A** hybrid heuristic algorithm for designing personalized day

tour routes in time-dependent stochastic settings. A *Jiuzhai Valley* case study demonstrates its superior performance over existing methods, yielding more realistic and personalized routes. The approach also examines uncertain environments' impact on tourists with varying risk awareness levels, emphasizing the algorithm's adaptability and relevance.

Amarah Shakil et al. [12], the paper discusses, how the World Wide Web has transformed travel information access, enabling ease and convenience in researching hotels, tickets, local travel and destinations. Consumers globally rely on the Internet for trip research, price comparisons and bookings, also driving the online travel industry's significant growth. This study analyzes the effectiveness of travel websites, particularly MakeMyTrip.com [13], examining their status in online marketing, especially in India. The rise of low-cost carriers has boosted online travel bookings in India's e-commerce landscape. Primary research evaluates consumer satisfaction, focusing on service parameters and identifying the company's strengths and future areas of improvement.

Lu Fan et al. [14], paper addresses the limitations in traditional travel route recommendations by proposing a personalized algorithm that *integrates text and photo data from travelogues*. Analyzing travel notes provides historical tourism footprints. The algorithm gauges scenic spot popularity and tourist preferences based on frequency, co-occurrence and photo count. It designs an optimal route generation method considering starting, ending or passing points. Experiments on **Ctrip** travel data reveal significantly enhanced accuracy compared to algorithms using text or photos alone. The method improves upon popularity-based and preference-based algorithms, achieving practical integration of picture and text data to cater to diverse user interests.

Svein Larsen et al. [15], the author proposes a threefold understanding of the tourist experience. Drawing from both tourism and psychological literature, it asserts that experiences result from expectations and events, shaping memories that inform new preferences and expectations. This cognitive approach differentiates between tourist events and their antecedents and outcomes. It underscores the individual's role in constructing a meaningful concept of tourist experiences, emphasizing the significance of the subject's involvement in this process.

Wouter Souffriau et al. [16], study introduces a tailored algorithm for mobile tourist guides that crafts individualized travel plans. This approach merges a genetic algorithm and a local search method to produce well-rounded itineraries, factoring in elements like attraction distances, visiting hours, and popularity. Computational tests showcase its efficacy, while prospects include integrating real-time data and user input. Challenges encompass dependence on historical data, possible preference modelling biases, and the requirement for real-world user validation.

Sajal Haldar et al. [17], the authors address the complexity of personalized itinerary

recommendation by introducing an adaptive **Monte Carlo** tree search **MCTS** based reinforcement learning algorithm, EffiTourRec. The algorithm prioritizes points of interest (POIs) with long visiting times and short queuing times, considering popularity and visitor interest. It aims to overcome issues with existing solutions that often lead to unsuitable POI recommendations due to short prior visiting periods. Additionally, the proposed method efficiently prunes non-optimal and duplicated itineraries using an MCTS search pruning technique. Experimental results on real theme park *data showcase significant improvements over baselines, with precision gains of 20.89% to 52.32%, F1-score enhancements of 8.36% to 21.35%, and execution time reductions of 40.00% to 67.64%*.

Mehedee Hassan et al. [18], authors underscore the significance of considering diverse sources for crime analysis and acknowledge the potential value of newspapers due to their extensive data along with notes that newspapers might lack sufficient structure for drawing conclusive insights. To address this, the author proposes a system employing data mining techniques for analyzing crime news from online newspapers. These techniques encompass the **NLTK** Library, Support Vector Machine Classifier (SVMC), Named Entity Recognition (NER), Cosine Similarity, **Tf-Idf** Vector and Hierarchical Clustering. This system leverages these methods to extract meaningful details from unstructured crime news, facilitating the determination of news relevance to crime, pinpointing crime locations, and grouping similar crime news based on content. The objective of the system is to enhance the accuracy and reliability of crime news information through this comprehensive analysis process.

Ashratuz Zavin et al. [19], authors propose in the context of metropolitan areas like Bangladesh, plagued by traffic congestion, the lack of efficient traffic prediction and avoidance mechanisms. The proposed system, integrating *Ant Colony Optimization*(ACO) and a *meta-heuristic* approach, calculates optimal routes considering historical and real-time traffic data across various time intervals. It dynamically adjusts routes to circumvent congestion, offering reliable real-time traffic insights. Experimental results affirm the system's effectiveness in providing improved navigation, potentially saving commuters valuable time in situations of heavy traffic.

2.2.2 Similar Applications

Skyscanner [20], TripAdvisor [21] and Google Flights [22] excel in providing flight and accommodation information, offering a user-friendly interface for booking. While these platforms offer personalized recommendations, their level of personalization might not be as advanced as envisaged by the research papers. The focus remains largely on booking and searching.

Airbnb [23] introduces an innovative accommodation-sharing model, promoting unique travel experiences. Despite this, the platform’s personalization capabilities may be constrained, potentially limiting its ability to tailor comprehensive itineraries.

Booking.com [24] and Expedia [25] emphasize accommodation options but may lack intricate destination-specific insights and comprehensive trip planning assistance that aligns with individual preferences. Similar limitations are observed in Sharetrip, Trivago and Kayak, where the focus predominantly revolves around booking facilities and comparative pricing.

Sharetrip.net [20] is a dynamic travel platform that facilitates travel planning through personalized recommendations and user-generated content, allowing travelers to share their experiences and insights. On the other hand, Kayak [26] operates as a comprehensive travel search engine, offering users the ability to compare flights, hotels and other travel services from various sources, aiding in finding the best options and deals. While Sharetrip.net emphasizes community-driven insights, Kayak focuses on aggregating and comparing travel information, both contributing to enhancing the travel planning experience in distinct ways.

Trivago [27] offers price comparisons for hotels, yet their potential for crafting immersive travel experiences remains unexplored. Wander Your Way [28] is a multi-functional travel platform that caters to various aspects of the travel experience. It employs personalized algorithms to suggest destinations aligned with user preferences. The platform assists in creating well-structured itineraries and optimizing routes for efficient exploration. Seamless integration with travel services streamlines booking processes for accommodations, transportation, and guided tours. The platform also offers real-time weather forecasts and a community hub for travellers to connect and exchange insights. This comprehensive set of functionalities contributes to a holistic and user-centred travel planning and exploration experience.

2.3 Gap Analysis

Feature	Similar Solution	Expecting to Improve
Personalized Recommendations and Itinerary Planning	Skyscanner [20] TripAdvisor [21] Booking [24] I Refanidis, C Emmanouilidis, I Sakellariou (2014) [29]	Detailed recommendations with each user's unique interests, ensuring a more tailored and enjoyable travel experience.
Travel Services Integration	TripAdvisor [21] Expedia [25] Kayak [26]	Beyond basic booking, allowing users to make informed choices based on not only cost but also their personal preferences and needs.
Local Insights	TripAdvisor [21] Booking [24] AirBnb [23]	Offer comprehensive local insights, including cultural nuances, hidden gems and authentic experiences.
Safety Information	Tripathy, Ajaya K. (2018) [30] Buhalis, Dimitrios and Yeyen Sinarta (2019) [31]	Real-time safety updates and travel advisories
Community Engagement	AirBnb [23] Booking [24] TripAdvisor [21]	Connect, exchange experiences and seek advice

Table 2.1: Comparative Analysis 01

Feature	Similar Solution	Expecting to Improve
Weather Forecast	Bi, Jian-Wu and Liu, Yang and Li, Hui (2020) [32] Google Flights [22]	Up-to-date weather forecast
Currency Conversion and Expense Tracking	Webber, Anthony G (2001) [32]	Expenses into a chosen currency, track expense and receive alerts when nearing those limits

Table 2.2: Comparative Analysis 02

2.4 Summary

In the preceding background section, we outlined the literature review, encompassing two segments: analogous applications and relevant research. Subsequently, we conducted a gap assessment, drawing from these studies and incorporating our own contribution. In the third chapter, we detailed the project's design.

Chapter 3

Project Design

In this chapter, we have presented our analysis of requirements, encompassing both functional and non-functional aspects. Additionally, we have showcased the context diagram, data flow diagrams at two levels, user interface design, comprehensive methodology and design, project planning and the distribution of tasks.

3.1 Requirement Analysis

Our system entails numerous requirements, some of which are apparent to users, while others remain hidden. To effectively analyze these requirements, we have categorized them into two sections:

1. Functional Requirements
2. Nonfunctional Requirements

3.1.1 Functional Requirements

Functional specifications encompass the essential functionalities or operations that developers must integrate to facilitate users in achieving their goals. It is vital to ensure that these specifications are comprehensible to both the development group and interested parties. Ordinarily, functional requirements delineate how a system behaves within particular situations. Instances include corporate rules, user verification, access control and engagements with external interfaces. In our system, we have structured functional requirements into three distinct segments.

- Admin Purpose:
 1. Content Moderation: Review and moderate user-generated content. Ensure compliance with platform guidelines and policies. Remove inappropriate, offensive, or fraudulent content.
 2. Listing Management: Manage business listings to ensure accurate and up-to-date information. Verify contact details, amenities, and other relevant data.

3. User Inquiries: Interact with users, addressing questions and concerns. Provide guidance and assistance with technical issues.
- User (Travelers) End:
 1. User Registration: Users must be able to create accounts with unique usernames and passwords.
 2. User Login: Existing users must be able to log in with their credentials securely.
 3. Chatbot Interaction: The application will offer a chatbot feature that will allow users to express their travel preferences effectively.
 4. Personalized Recommendations: Based on user preferences, data and intelligent algorithms, the system will provide personalized recommendations for destinations, attractions, accommodations and local events. accommodations and events, with options for filtering based on criteria such as location, budget and date.
 5. User Feedback and Support Through Blogpost: There will be a feedback system for users to report issues, suggest improvements or seek assistance.
 - Service Provider End:
 1. Promote Services: Service providers can showcase their accommodations, attractions, transportation options and activities within the app, increasing their visibility and attracting potential customers.
 2. Customized Offers: Utilizing user data, service providers can tailor special offers and packages based on individual preferences, encouraging users to engage with their services.
 3. Collaborative Marketing: Service providers become part of a comprehensive ecosystem that collectively promotes the travel experience, creating cross-promotional opportunities.
 4. Enhanced Engagement: Service providers can engage users with rich content, images and videos, showcasing the unique aspects of their offerings and attracting more travelers.
 - System End:
 1. Valid login details are required for enrollment in the travel management system and the system verifies their authenticity against the database.
 2. The system includes a password recovery feature for user convenience.

3.1.2 Nonfunctional Requirements

A non-functional requirement pertains to systems engineering and requirements, outlining criteria for evaluating system performance rather than detailing explicit behaviours.

Unlike functional requirements, which delineate precise functions, non-functional requirements encompass characteristics of the system, such as security, dependability, scalability, performance, maintainability and user-friendliness. In our system, certain non-functional requirements have been identified.

1. Performance: The application must be responsive and able to handle a large number of simultaneous users. Response times for searches and recommendations will be fast.
2. Scalability: The system will be designed to be scalable, allowing for future growth and increased user activity.
3. Security: The application will implement robust security measures to protect user data and transactions. Encryption will be used for sensitive information.
4. Data Privacy: Compliance with data privacy regulations will be ensured. User consent will be obtained for data collection and processing.
5. Reliability: The application will be reliable and available 24/7, with minimal downtime for maintenance.
6. Usability: The user interface will be intuitive and easy to navigate, even for users with limited technical knowledge.
7. Compatibility: The application will be compatible with various devices and web browsers.
8. Data Backup and Recovery: Regular data backups will be performed and there will be a plan for data recovery in case of system failures.
9. Integration: The application will integrate with external APIs and data sources to provide real-time information such as weather forecasts and local event updates.
10. Cost-Efficiency: The project will optimize the use of resources to keep operating costs manageable.

3.2 Objectives

3.2.1 Context Diagram

The context diagram, also referred to as a data flow diagram level 0, serves as a concise summary of the entire system or process under examination. This high-level view presents the system as a singular, overarching process and its interactions with external entities. In Figure 3.1, our system's context diagram is depicted, delineating the three primary modules: Travellers, Service Providers and Admin. These modules engage with the entire system through a mechanism of requests and responses.

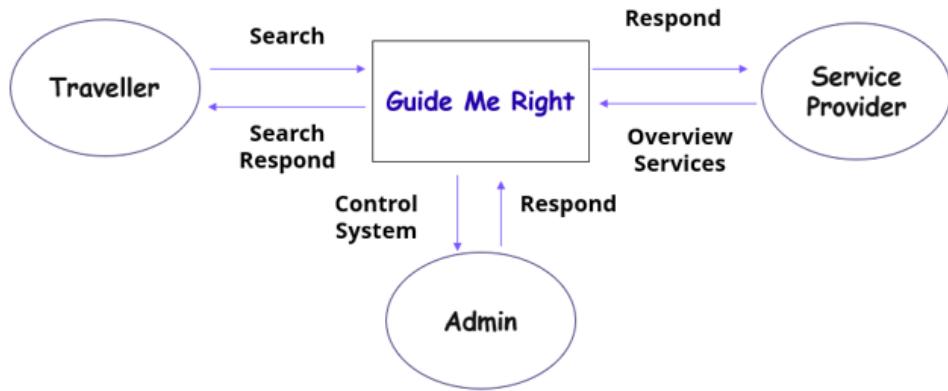


Figure 3.1: Context Diagram

3.2.2 Data Flow Diagram (DFD)

Compared to a context diagram, DFD goes into greater detail. Using DFD, the single process node is divided into sub-processes. According to Figure 3.2, Travellers can create their profile, see posts, view profile info, make and see plans, view and select places and maintain a dashboard. On the other hand, an admin can maintain travelers and service providers. Service Providers can update hotel info, view hostels and maintain a dashboard.

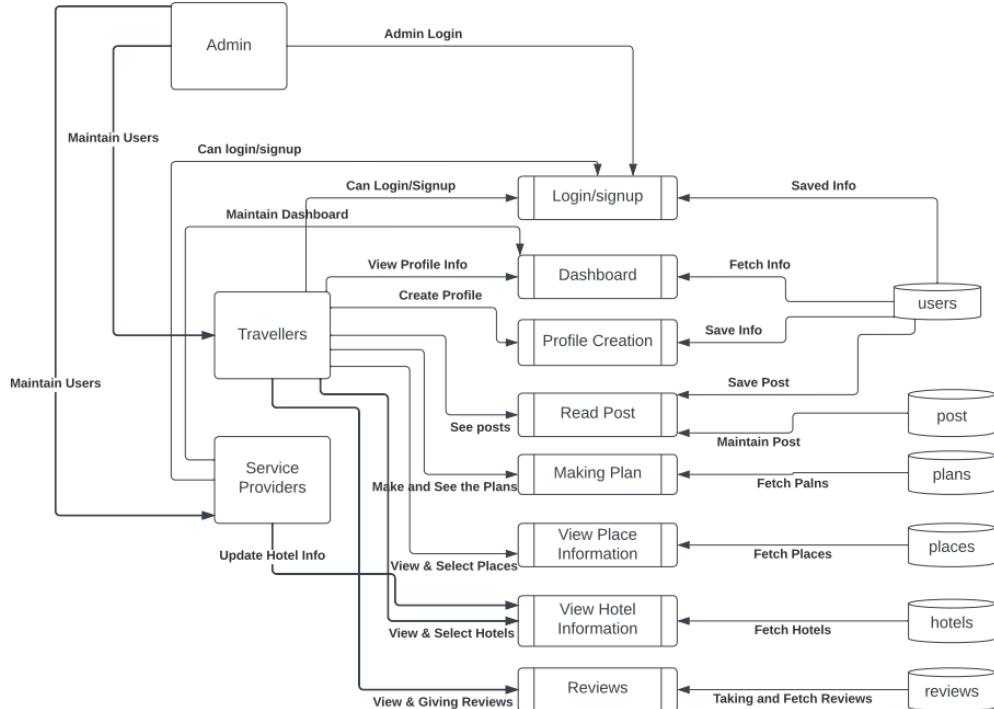


Figure 3.2: Data Flow Diagram

3.2.3 UI

User interface (UI) design encompasses the creation of interfaces for software and computerized devices, emphasizing the visual and stylistic aspects. In this section, we showcase the UI design for our system, featuring components such as the homepage, homepage search function, preference selection and trip planning functionalities.

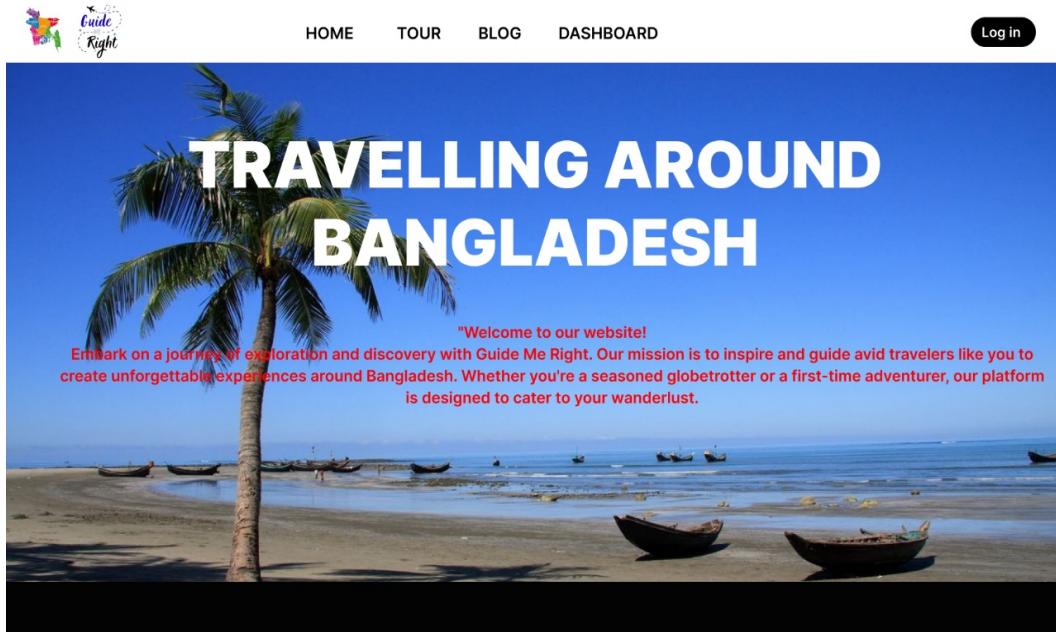


Figure 3.3: Home Page

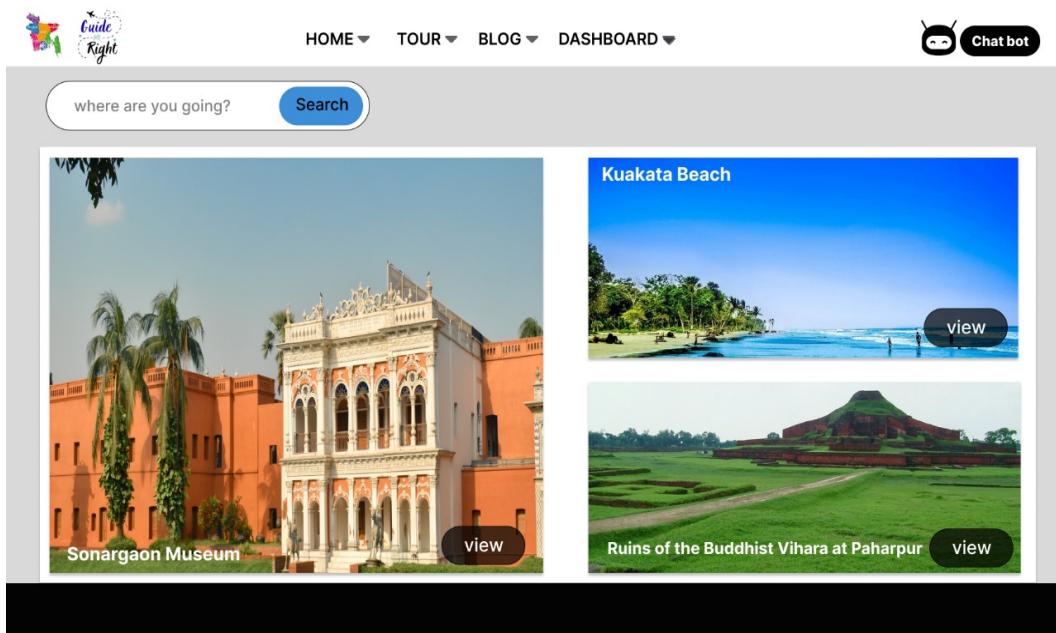


Figure 3.4: Home Page Search

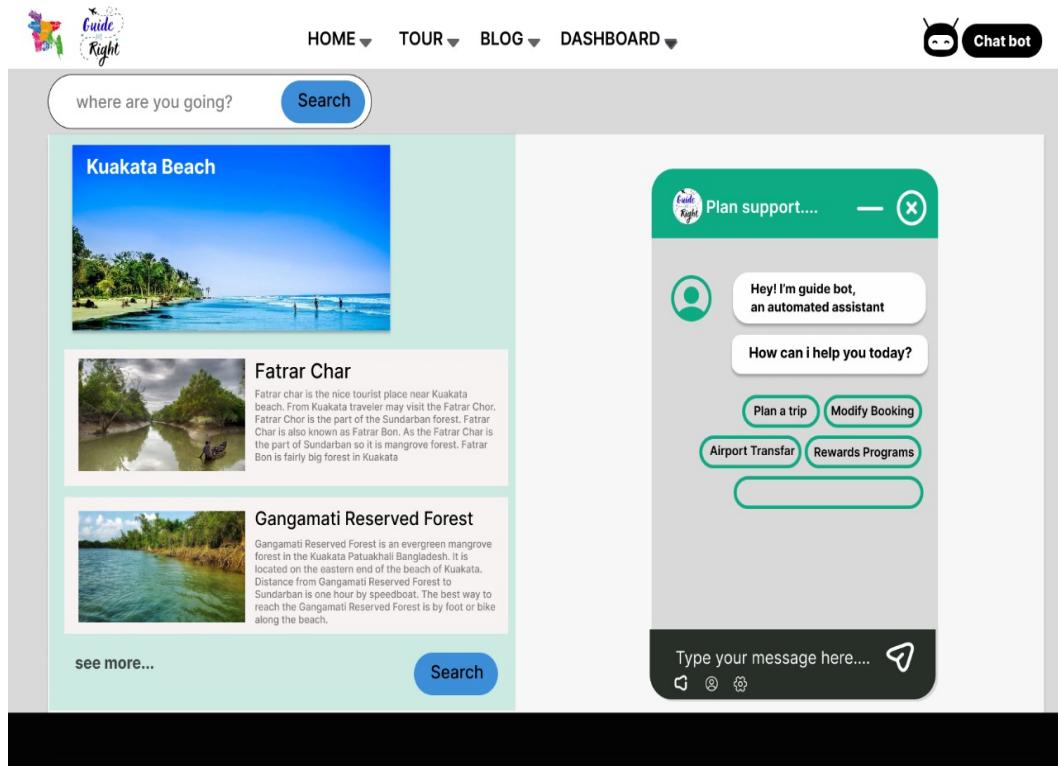


Figure 3.5: Preference Selection

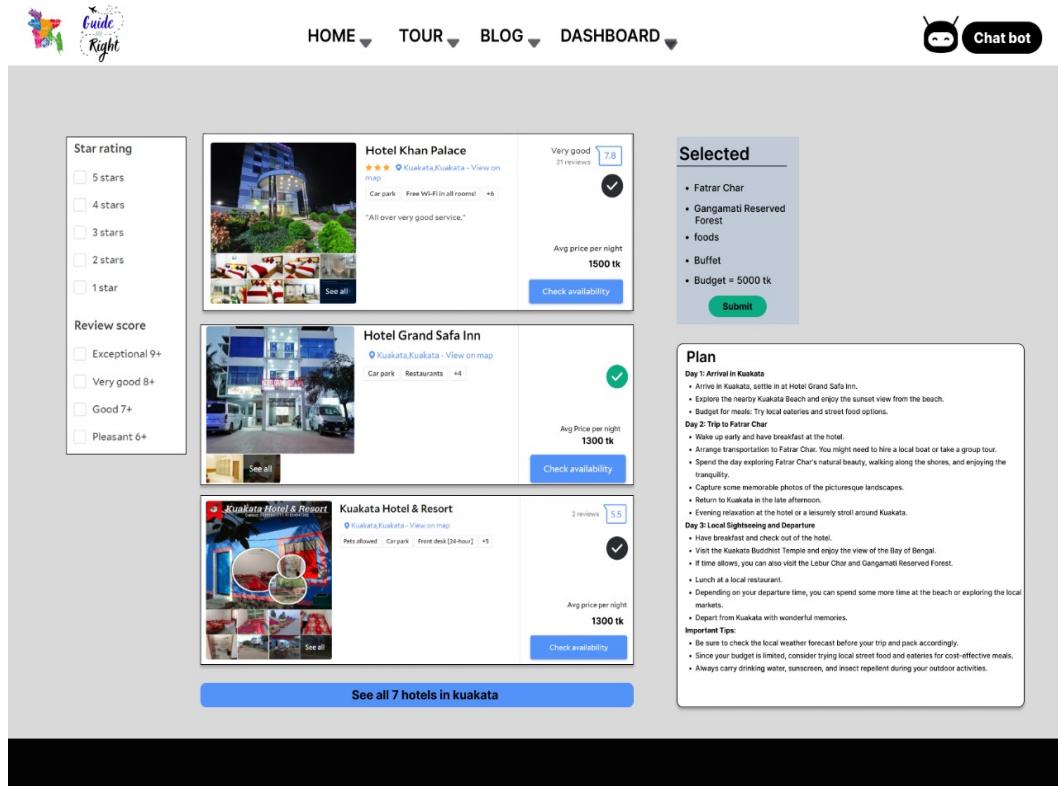


Figure 3.6: Trip Plan

3.3 Detailed Methodology and Design

We have devised a system aimed at addressing the challenges frequently encountered by travellers. Oftentimes, travellers encounter difficulties in discovering suitable destinations. In our system, travellers have the opportunity to find the destination according to their preferences. Additionally, they can find the accommodation according to their preferences and minimal distance covered for their multiple tourist site. Besides, they can get event update, weather update, create and enjoy blog post.

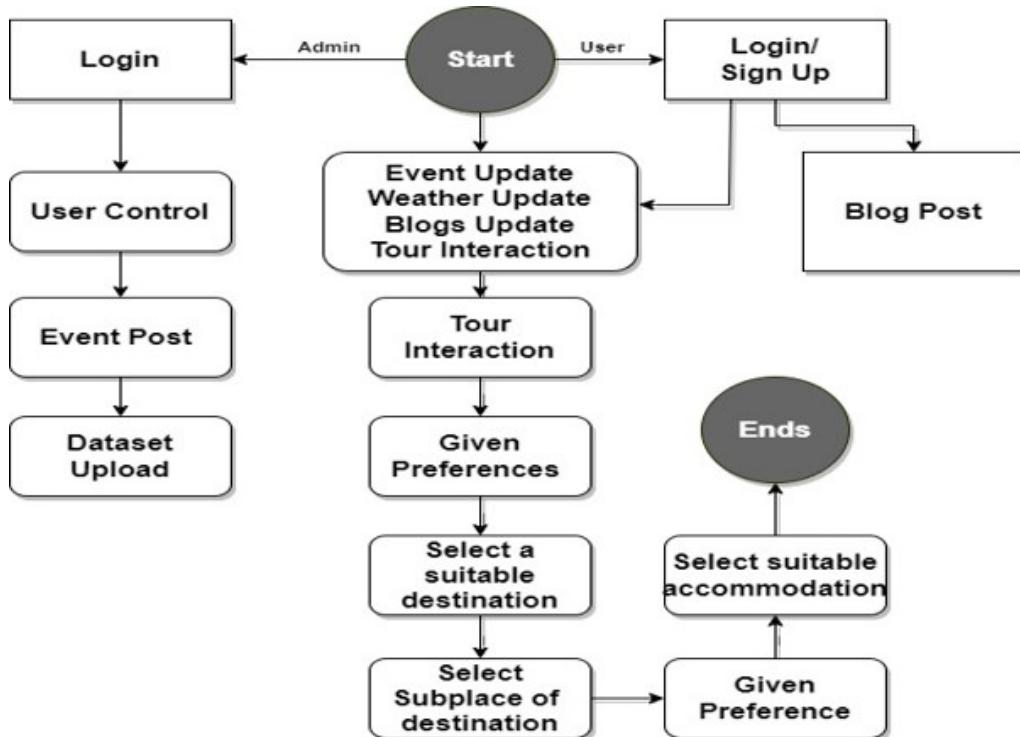


Figure 3.7: System Workflow

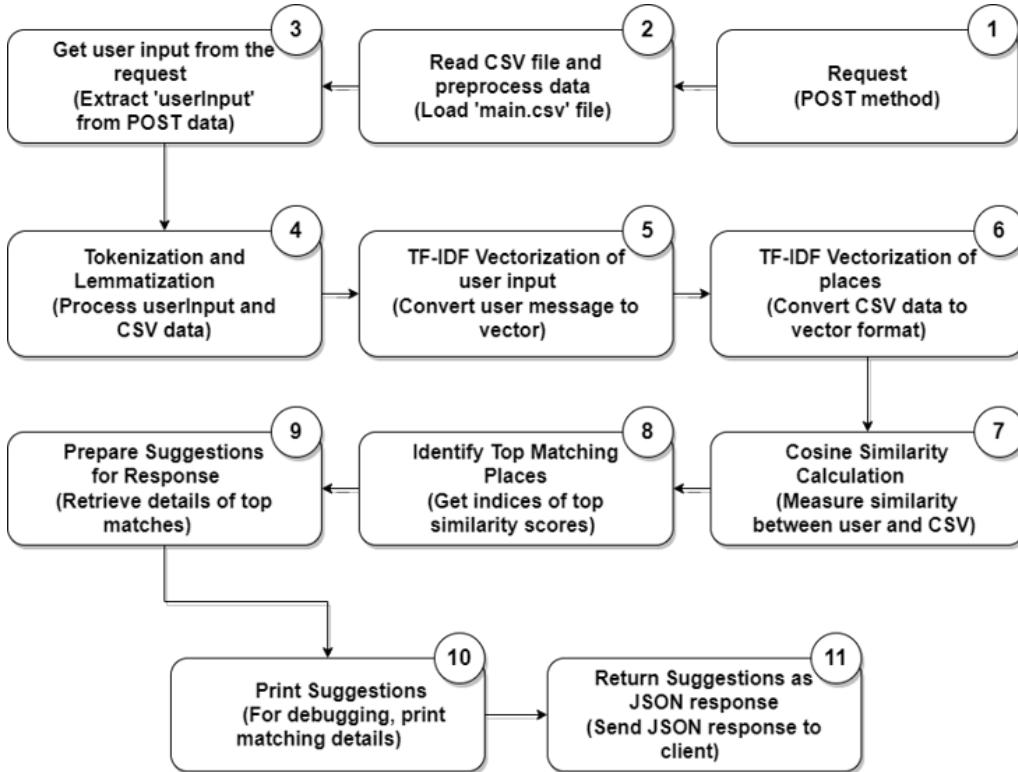


Figure 3.8: Algorithm working Method of Place Recommendation

3.4 Project Plan

The project plan encompasses a collection of formal documents outlining the project's implementation and control phases. In the development of our system, we have employed a Gantt chart for this purpose. To create this Gantt chart, we utilized dedicated software, specifically JIRA [33]. Our project plan is divided into two segments, as illustrated in Figure 3.9, denoting the FYDP-01 and Figure 3.10, signifying the FYDP-02 plan. During the project definition phase, we have broken it down into various tasks, which were subsequently further dissected into smaller sub-tasks. The entire schedule is set to commence on June 06, 2023 and conclude on January 28, 2024. In the FYDP-02 plan 3.10, the implementation part has been divided into several parts with agile methodology. The divided tasks are all front ends, admin panel, login panel, signup panel, admin panel, event update, blog post, whether update, OTP verification, dataset integration, place recommendation, accommodation recommendation and user login with Google account. The tasks have developed one after one.

3.4. Project Plan

Chapter 3. Project Design

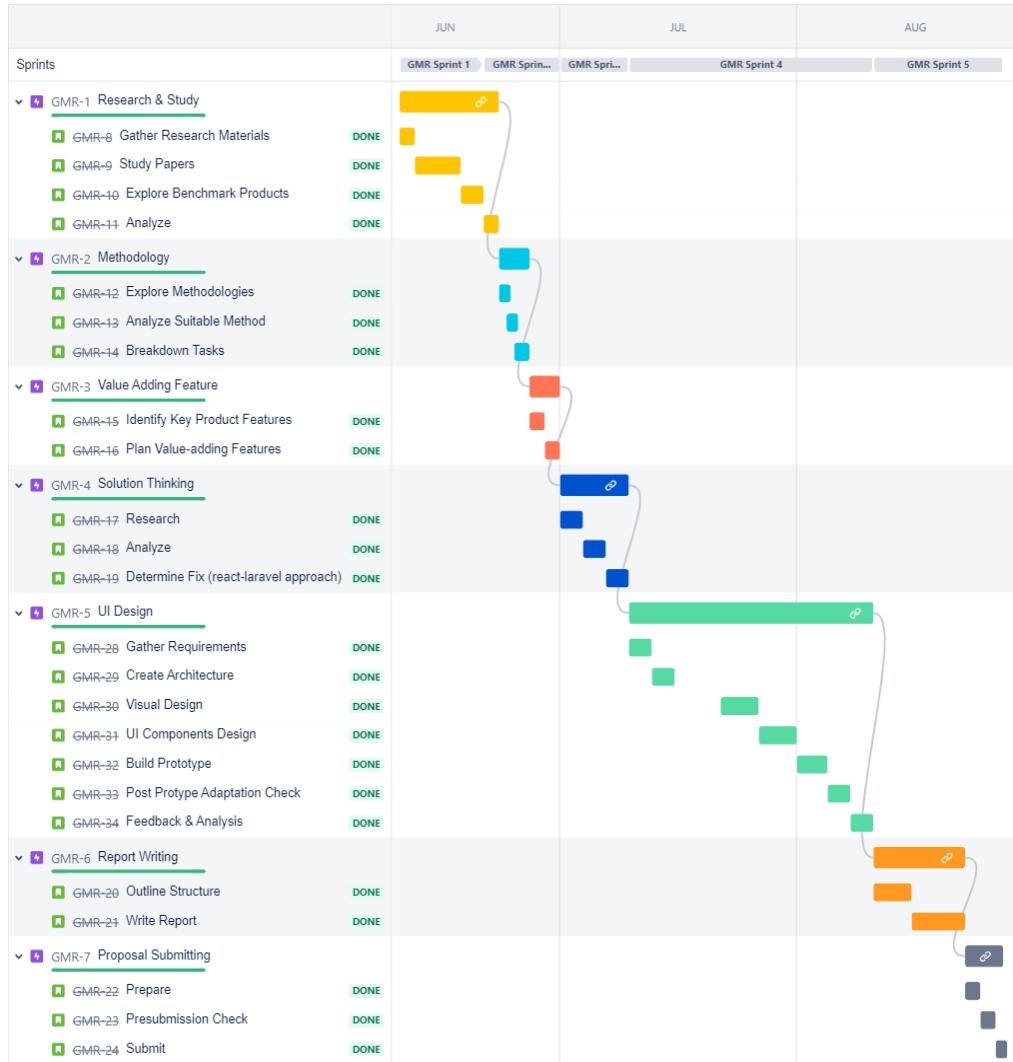


Figure 3.9: Project Plan for FYDP-01

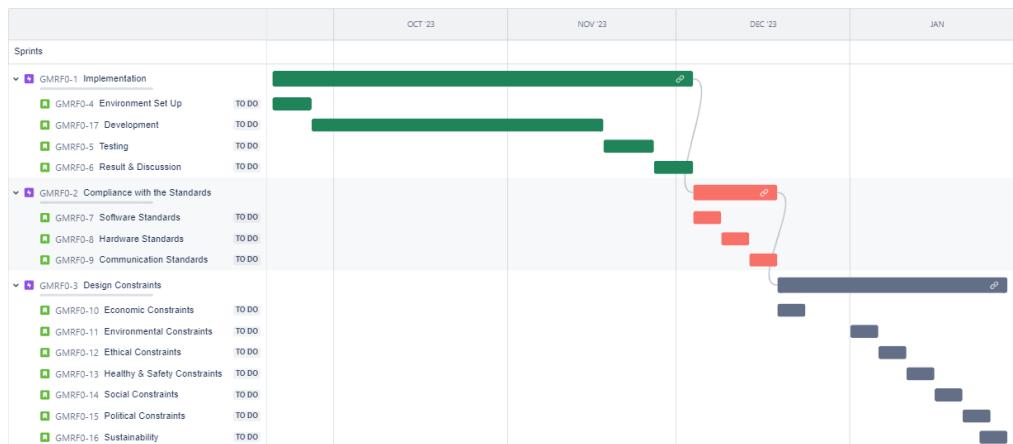


Figure 3.10: Project Plan for FYDP-02

3.5 Task Allocation

In this section, we have proposed our approximate task allocation for the entire project.

Task	Name
Project Idea	All
Complex Engineering Problem	Santi Brata Nath (Joy), Saikat Hossain, Shamim Bin Nur
Investigation about related work	All
Set goal and objectives	Saikat Hossain, Santi Brata Nath (Joy)
Analysis of a baseline paper	Santi Brata Nath (Joy)
Abstract	Santi Brata Nath (Joy)
Introduction	Santi Brata Nath (Joy), Mehedi Hassan
Project Overview	Santi Brata Nath (Joy)
Motivation	Md. Lailafin Nahar Tithy
Background Section	Santi Brata Nath (Joy)
Context Diagram	Nazmul Hoda, Md. Mehedi Hassan
Data Flow Diagram	Saikat Hossain, Md. Shamim Bin Nur
Project Plan	Santi Brata Nath (Joy)
Cost Analysis	Nazmul Hoda, Lailafin Nahar Tithy

Table 3.1: Task Allocation 01

UI Design	Nazmul Hoda, Saikat Hossain, Lailafin Nahar Tithy
Frontend Development	Nazmul Hoda, Md. Mehedi Hassan
Backend Design	Md. Shamim Bin Nur, Lailafin Nahar Tithy
Database Design	Saikat Hossain, Md. Mehedi Hassan
Backend Development	All
Admin, Login, Signup, Event Update	Santi Brata Nath (Joy), Mehedi Hassan
Blog Post, Wheather Update, OTP Verification	Nazmul Hoda, Mehedi Hassan
Dataset Integration	Santi Brata Nath (Joy)
Place Recommendation	Saikat Hossain
Accommodation Recommendation	Shamim Bin Nur
User Login With Google Account	Lailafin Nahar Tithy
Software Standards	Nazmul Hoda, Lailafin Nahar tithy
Economic Constraints	Md. Mehedi Hassan, Md. Shamim Bin Nur
Environmental Constraints	Lailafin Nahar Tithy, Saikat Hossain
Social Constraints	Santi Brata Nath (Joy)
Sustainability	Nazmul Hoda, Lailafin nahar Tithy

Table 3.2: Task Allocation 02

3.6 Summary

Within the Project Design chapter, we delve into requirement analysis, encompassing both functional and non-functional requirements. Following this, we introduce a context diagram and data flow diagrams. Furthermore, we present the UI design for our system. Additionally, we outline our project plan and task allocation. In Chapter 4, we shift our focus to the implementation and outcomes of our project.

Chapter 4

Implementation and Results

This chapter has discussed environment setup, testing and evaluation and results and discussion.

4.1 Environment Setup

Choosing an optimal tour plan can be quite challenging for tourists. Simultaneously, service providers often struggle to maximise their profits due to inefficient management systems. The primary aim of our project was to establish a platform that facilitates enhanced connectivity between service providers and customers while assisting travellers in selecting the most suitable plans. Our system was meticulously developed employing the following strategies:

Development Environment

1. Integrated Development Environment (IDE): We have utilized the following development tools and IDs:
 - Front-End Development: Visual Studio Code (VSCode) [34] for HTML, CSS, and JavaScript development.
 - Back-End Development: Python and Django.
 - Database Management: Open-Django Database Platform [35] Workbench for database schema design and management.
2. Version Control: Git [36] has been used for version control and the project repository has been hosted on GitHub [37]. This facilitates collaborative development and version tracking.

Programming Languages and Frameworks

1. Front-End Development:
 - HTML5/CSS3: For creating the user interface and styling.

- JavaScript (ES6+): For client-side scripting and interactivity.

2. Back-End Development:

- Python For server-side logic and API development with Django.

3. Database Management:

Dependencies and Libraries

1. Node.js and npm: Node.js has been used for package management and running JavaScript build tools.
2. Django (NLP Compatibility): Django has been used as the back-end framework for building robust back-end services.
3. APIs and External Services: We have integrated external APIs for real-time information, such as weather forecasts and local event updates.

4.2 Implement Feature

Dataset

A	B	C	D	E	F
Place Name	Category	Description	Location	Entry Fee (BDT)	Opening Hours
Patenga Sea Beach	Beach	A beautiful beach with a view of the hills.	Patenga, Chittagong	Free	Open 24 hours
Foy's Lake Concord	Amusement Park	An amusement park with a lake and a cable car ride.	Pahartali, Chittagong	200 BDT	10:00 AM to 8:00 PM
Shrine of Bayazid Bostami	Religious Site	A shrine dedicated to a famous Sufi saint.	Nasirabad, Chittagong	Free	Open 24 hours
Shahid Minar, Chittagong	Monument Park	A historical park featuring a tall minaret and other structures.	Shahid Minar, Chittagong	50 BDT	10:00 AM to 8:00 PM
Ethnological Museum	Museum	A museum showcasing the history and culture of Bangladesh.	Agrabad, Chittagong	20 BDT	10:00 AM to 5:00 PM
Hazarikhel Wildlife Sanctuary	Wildlife Sanctuary	A wildlife sanctuary with a variety of flora and fauna.	Sitakunda, Chittagong	Free	Open 24 hours
Chittagong Zoo	Zoo	Chittagong Zoo is a zoo that houses a wide variety of animals.	Foy's Lake, Chittagong City	50 BDT	10:00 AM - 5:30 PM
Chandranath Hills and Temples	Historical Site	Chandranath Hills and Temples is a historical site that is known for Sitakunda Upazila, Chittagong	Free	N/A	
Cox's Bazar Sea Beach	Beach	The largest beach in the world and the most popular tourist destination.	Laboni Beach Rd, Cox's Bazar, Chatogram	Free	Open 24 hours
Saint Martin	Island	A picturesque island with turquoise waters and coconut trees.	Saint Martin's Island, Teknaf, Cox's Bazar	Free	Open 24 hours
Mahekhali	Island	A beautiful island with a Buddhist temple and a Hindu temple.	Mahekhali Island, Cox's Bazar	Free	Open 24 hours
Inani Sea Beach	Beach	A beach with crystal clear water and coral reefs.	Inani Beach, Cox's Bazar	Free	Open 24 hours
Himchari	Waterfall	A scenic waterfall with a beautiful view of the sea.	Himchari, Cox's Bazar	Free	Open 24 hours
Chera Dwip	Island	A small island with a beautiful beach and a lighthouse.	Chera Dwip, Cox's Bazar	Free	Open 24 hours
Sonadia Island	Island	A beautiful island with a mangrove forest and a fishing village.	Sonadia Island, Cox's Bazar	Free	Open 24 hours
Radiant Fish World	Aquarium	An aquarium with a variety of fish and other marine creatures.	Marine Drive Road, Cox's Bazar	50 BDT	9:00 AM to 6:00 PM
Shapuree Island/Shah Porir Dwip	Island	A small island with a beautiful beach and a lighthouse.	Shapuree Island, Cox's Bazar	Free	Open 24 hours
Ramna Park	Garden	A beautiful garden with rubber trees and a lake.	Ramna Park, Dhaka	Free	9:00 AM to 5:00 PM
Nirwita Mihirgo Park	Park	A sprawling park with a variety of flower gardens.	Teknaf, Cox's Bazar	Free	Open 24 hours
Lamapara Khanda	Temple	A beautiful Buddhist temple with a scenic view of the sea.	Inani Beach, Cox's Bazar	Free	9:00 AM to 5:00 PM
Inani Royal Resort	Resort	A luxury resort with a private beach and a swimming pool.	Inani Beach, Cox's Bazar	5000 BDT	Open 24 hours
Mathinor Kun - Well of Mathin	Well	A historical well with a beautiful view of the sea.	Teknaf, Cox's Bazar	Free	Open 24 hours
Royal Tulip Sea Pearl Beach Resort And Spa	Resort	A luxury resort with a private beach and a spa.	Jalilapalong, Inani, Cox's Bazar	8000 BDT	Open 24 hours
Mermaid Beach Resort	Resort	A luxury resort with a private beach and a swimming pool.	Marine Drive Road, Cox's Bazar	5000 BDT	Open 24 hours
SHAMALPUR BEACH	Beach	A beautiful beach with a view of the hills.	Shamalpur, Cox's Bazar	Free	Open 24 hours
Adinath Temple	Temple	A beautiful Hindu temple with a scenic view of the sea.	Maheshkhali Island, Cox's Bazar	Free	Open 24 hours
Dulahazara Safari Park	Safari Park	A wildlife park with a variety of animals.	Dulahazara, Cox's Bazar	100 BDT	9:00 AM to 5:00 PM
Kutubdia	Island	A small island with a beautiful beach and a lighthouse.	Kutubdia Island, Cox's Bazar	Free	Open 24 hours
Doria Nogor	Village	A beautiful village with a scenic view of the sea.	Doria Nogor, Cox's Bazar	Free	Open 24 hours
Marine Drive Road	Road	A scenic road with a beautiful view of the sea.	Marine Drive Road, Cox's Bazar	Free	Open 24 hours
RAMU BUDDHIST MONASTERY	Monastery	A beautiful Buddhist monastery with a scenic view of the sea.	Ramu, Cox's Bazar	Free	9:00 AM to 5:00 PM
Shalbon Buddha Bihar	Archaeological Site	A historical site known for its rich history and archaeological remains.	Comilla	Free	Open 24 hours

Figure 4.1: Dataset

Algorithm

```
def sub_place_chatbox(request):
    file_path = 'main.csv'
    df = pd.read_csv(file_path)

    if request.method == 'POST':
        user_message = request.POST.get('userInput', "")

        print(user_message)
```

Figure 4.2: Algorithm part-1

```
# Combine 'Category' and 'Description'  
df['Combined Features'] = df['Category'] + ' ' + df['Description']  
  
# Tokenization and Lemmatization  
stop_words = set(stopwords.words('english'))  
lemmatizer = WordNetLemmatizer()  
  
def preprocess(text):  
    tokens = word_tokenize(text)  
    tokens = [lemmatizer.lemmatize(token.lower()) for token in tokens if  
             token.isalpha() and token.lower() not in stop_words]  
    return ' '.join(tokens)  
  
df['Combined Features'] = df['Combined  
Features'].fillna("").apply(preprocess)  
user_message = preprocess(user_message)
```

Figure 4.3: Algorithm part-2

```
# TF-IDF Vectorization  
vectorizer = TfidfVectorizer()  
user_message_vector = vectorizer.fit_transform([user_message])  
places_vectors = vectorizer.transform(df['Combined Features'])  
  
# Cosine Similarity  
cosine_similarities = cosine_similarity(user_message_vector,  
places_vectors).flatten()
```

Figure 4.4: Algorithm part-3

```
# Get the index of the top match
top_match_indices = cosine_similarities.argsort()[:-1][-2]

suggestions = []
for index in top_match_indices:
    match_details = df.iloc[index]

    suggestion = {
        'Place Name': match_details['Place Name'],
        'Category': match_details['Category'],
        'Description': match_details['Description'],
        'Location': match_details['Location'],
        'Entry Fee (BDT)': match_details['Entry Fee (BDT)'],
        'Opening Hours': match_details['Opening Hours']
    }

    suggestions.append(suggestion)

print(suggestions)

return JsonResponse({'suggestions': suggestions})

return render(request, 'select_sub_place_chat.html')
```

Figure 4.5: Algorithm part-4

4.3 Results and Discussion

As our expectation, we found two most important results from our system:

1. Recommended Place: User can get recommendation of tourist destination according to their preferences.
2. Recommended Accommodation: User can get recommendation of accommodation according to their preferences and also the minimal distance covered for their multiple chosen destination.

4.4 Summary

Within the Implementation and Results section, we delved into the system environment. In Chapter 5, we provided a detailed account of the standards and design constraints that influenced our project.

Chapter 5

Standards and Design Constraints

Within this chapter, an in-depth exploration has been undertaken, covering a spectrum of critical aspects including adherence to established standards, software standards, design limitations, economic considerations, environmental factors, social constraints, sustainability perspectives, cost assessments and intricate engineering challenges.

5.1 Compliance with the Standards

Within this section, we've meticulously documented the standards that pertain to our system. Additionally, we've conducted a comprehensive analysis of alternative standards, evaluating their respective merits and drawbacks. Given the absence of hardware components in our project, hardware constraints become irrelevant and our focus has centered on software standards and communication protocols.

5.1.1 Software Standards

Our project adheres to industry-standard software development practices, which include:

- **Code Style and Formatting:** We have followed a consistent code style and formatting guide to maintain code readability and consistency throughout the project. We have chosen the for its wide adoption and readability benefits.
- **Documentation Standards:** Our project has maintained comprehensive code documentation using MkDocs [38], which is widely accepted for documenting code, APIs and user guides.
- **Security Standards:** Security best practices, such as input validation, authentication and authorization, have been implemented following, ensuring the protection of user data and the application.

The Agile Software Development Life Cycle (SDLC) [39] encompasses several models, and from this array, we have specifically selected the Agile SDLC model for our project's

implementation. The Agile SDLC methodology is founded on a collaborative approach that fosters decision-making between the requirements and solutions teams. It employs an iterative and cyclical process to craft functional software. This process is delineated into sprints, each spanning two to four weeks, dedicated to accomplishing specific tasks. Notably, this model excels in adaptability, offering greater flexibility compared to other approaches. Moreover, it has the potential to enhance developer productivity.

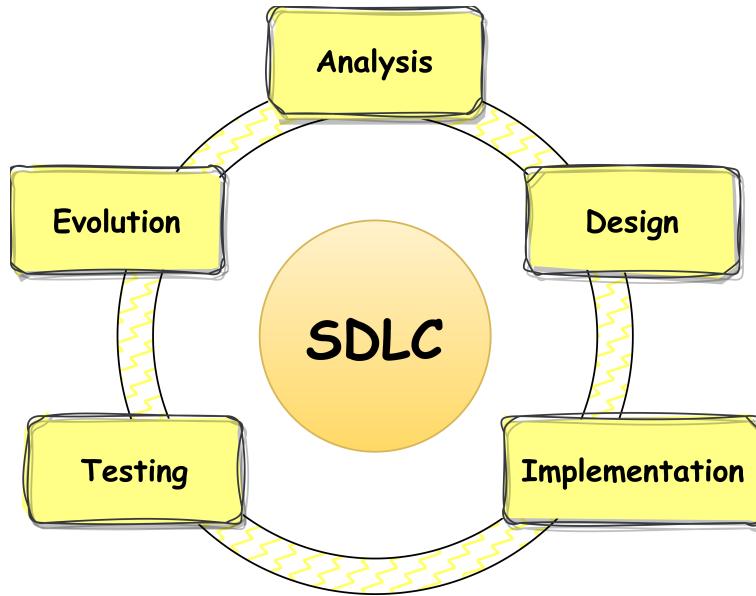


Figure 5.1: Software Development Life Cycle

We began by breaking down the entire project into manageable modules. These modules are then subdivided into sprints. The process unfolds systematically, commencing with project planning, followed by a meticulous requirement analysis. After a comprehensive understanding of the requirements, the design phase is initiated. Once the design is complete, the development phase begins. Each stage progresses to the release preparation as it successfully meets the necessary criteria. Only when all sprints have been completed and reviewed was the entire system deemed ready for release. In summary, this model's simplicity compared to previous approaches makes it the preferred choice for developing our system.

Scrum Framework: The project primarily followed the Scrum framework, which divides the development process into short iterations called sprints. Each sprint, typically lasting 2-4 weeks, focused on delivering a set of prioritized features. Daily stand-up meetings were conducted to monitor progress and address any challenges [40].

5.2 Design Constraints

Design constraints were vital conditions that had to meet to ensure the successful completion of a project. They served the crucial role of guiding decision-making processes throughout the project's development. In our discussion, we focused exclusively on design-related constraints that hold relevance to our project. We had only discussed the constraints that are relevant to the project's design. Design constraints for our project encompass ensuring technical compatibility across devices and platforms, safeguarding data privacy and security, and ensuring scalability to accommodate increasing users. Striking a balance between functionality and user experience was essential, as was addressing integration complexities with external services. Network reliability, local considerations, and resource optimization were vital, as well as complying with industry regulations and standards. Establishing a feedback loop for continuous improvement rounds out the constraints.

5.2.1 Economic Constraint

Budgetary Limitations

- Constraint: The project operates within a defined budget, limiting resource allocation for design, development, and ongoing maintenance.
- Rationale: The economic constraint necessitates cost-conscious design choices, resource optimization, and careful financial planning throughout the project lifecycle.

5.2.2 Ethical Constraint

Ethical Data Handling

- Constraint: The project tried to handle user data ethically and transparently, addressing concerns related to data privacy and security.
- Rationale: The design prioritized user data protection and transparency in data collection and processing practices to build user trust and maintain ethical standards.

5.2.3 Social Constraint

Cultural Sensitivity

- Constraint: The project had to be culturally sensitive to the diverse user base, considering language, customs and traditions.
- Rationale: Design decisions were taken into account cultural nuances to ensure that content and recommendations provided by the application are respectful and sensitive to different cultural backgrounds.

5.2.4 Sustainability

Long-Term Viability

- Constraint: The project was designed with long-term sustainability in mind, considering factors such as technology evolution and changing user needs.
- Rationale: Sustainability was crucial for the project's continued relevance and success. The design was adaptable and flexible to accommodate future changes and advancements.

5.3 Sustainable Development Goals (SDGs)

Our personalized travel assistant application is inherently connected to several Sustainable Development Goals (SDGs) [41] established by the United Nations, reflecting its role in addressing global challenges and fostering a sustainable future:

- SDG 3: Good Health and Well-being: The application supports travellers' well-being by offering weather forecasts and safety information, facilitating the planning of health-conscious and safe activities [42].
- SDG 8: Decent Work and Economic Growth: By connecting travellers with local enterprises and services, our project can contribute to economic growth, job creation and the promotion of responsible tourism, thereby supporting decent work and economic development [43].
- SDG 9: Industry, Innovation and Infrastructure: Our project embodies innovation and technological advancement by utilizing AI, data analytics and user-centric design to create a cutting-edge travel planning solution, thus contributing to developing modern infrastructure and sustainable tourism practices [44].
- SDG 11: Sustainable Cities and Communities: The application promotes sustainability by providing travellers with insights into local culture, hidden gems and authentic experiences. This, in turn, supports the development of sustainable communities and mitigates the adverse effects of mass tourism on urban areas and cultural heritage [45].
- SDG 12: Responsible Consumption and Production: Our project encourages responsible consumption by equipping travellers with tools for budget management, expense tracking and currency conversion, facilitating informed decision-making and resource management during their journeys [46].
- SDG 17: Partnerships for the Goals: The application has the potential to foster partnerships between travellers, local businesses, tourism authorities and service providers, aligning interests to enhance the travel experience and stimulate the local economy in pursuit of sustainable tourism [47].

5.4 Cost Analysis

Prior to commencing a project, understanding its anticipated costs is of paramount importance. Therefore, the creation of a detailed hypothetical financial year plan for the project becomes essential. Such a plan proves invaluable in estimating the potential construction expenditures for the project. In this section, we provide a financial plan derived from research conducted on several online articles [48].

Purpose	Amount (BDT)
API cost	12,000
Learning Cost	29,000
Total	41,000

Table 5.1: Budget

5.5 Complex Engineering Problem

Incorporating complex engineering problems into the engineering education curriculum holds significant importance. Within this section, we delve into the realm of intricate problem-solving and engineering activities.

5.5.1 Knowledge Profile

The table offers an overview of problem-solving categories. Within each mapping, we have included subsections to provide a rationale.

K1 Natural Sciences	K2 Mathematics	K3 Engineering Fundamentals	K4 Specialist Knowledge	K5 Engineering Design	K6 Engineering Practise	K7 Comprehension	K8 Research Literature
✗	✓	✓	✓	✓	✓	✓	✓

Table 5.2: Mapping with Knowledge Profile

K2 (Mathematics)

Conceptually based mathematics, numerical analysis, statistics and formal aspects of computer and information science to support analysis and modelling applicable to the discipline. We used different mathematical techniques in the project to calculate optimal distance.

K3 (Engineering Fundamentals)

A systematic, theory-based formulation of engineering fundamentals is required in the engineering discipline. Our project applies engineering fundamentals to design and develop the personalized travel assistant application, ensuring a solid foundation for its functionalities and features.

K4 (Specialist Knowledge)

We have employed up-to-date software versions, including HTML, CSS, React, Node.js, and various specialized tools, which are now standard for developing web-based projects. Consequently, we have opted for the K4 profile.

K5 (Engineering Design)

The knowledge that supports engineering design in a practice area. Our project applies knowledge of user preferences, travel data, and algorithms to support the engineering design of the personalized travel assistant application, ensuring it meets the needs and expectations of users.

K6 (Engineering Practise)

Knowledge of engineering practice (technology) in the practice areas in the engineering discipline. Our project leverages knowledge of engineering practice in software development, data analysis, and integration with travel services to implement the functionalities and features of the personalized travel assistant application.

K7 (Comprehension)

Our project involves a comprehensive understanding of engineering's societal role and the recognition of engineering practice-related issues. It emphasizes the ethical aspects and the professional responsibility of engineers towards public safety. Furthermore, we address the broader impacts of engineering activities, encompassing economic, social, cultural, environmental, and sustainability factors. In our system, we cater to travellers who are integral members of society. Additionally, we acknowledge that tourists visiting attractions have an impact on our society and country. Moreover, by optimizing vehicle usage, we contribute to reducing the environmental carbon footprint.

K8 (Research Literature)

Our knowledge base has been enriched through an extensive literature review process. Prior to initiating our project, we conducted comprehensive research by analyzing approximately twelve scholarly papers. These publications encompassed diverse types, ranging from web-based studies to machine learning-focused investigations and economics-oriented articles. Within these papers, we delved into the various challenges posed and the corresponding solutions proposed by researchers in the field.

5.5.2 Complex Problem Solving

Table 5.2 presents a comprehensive mapping of problem-solving categories with accompanying subsections providing justifications for each category.

P1 Dept of Knowledge	P2 Range of Conflicting Requirements	P3 Depth of Analysis	P4 Familiarity of Issues	P5 Extent of Applicable Codes	P6 Extent of Stakeholder Involvement	P7 Inter-dependence
✓	✓	✓	✗	✗	✓	✗

Table 5.3: Mapping with complex problem solving

P1 (Depth of Knowledge)

Our system comprises one or more knowledge profiles, each of which demands a thorough understanding for effective operation. Within our system, several components exist, some of which may not be readily apparent. In the past, there were instances where we couldn't utilize certain components optimally due to a lack of in-depth knowledge. Therefore, acquiring a profound understanding of our system is paramount, as it significantly influences its proper functioning.

P2 (Range of Conflicting Requirements)

Involve wide-ranging or conflicting technical, engineering, and other issues. Our project deals with various technical and engineering aspects, including data integration, algorithm development, user preferences, travel services integration and user experience optimization. These issues may have conflicting requirements that need to be carefully managed.

P3 (Depth of Analysis)

Have no obvious solution and require abstract thinking, and originality in analysis to formulate suitable models. Our project involves developing innovative algorithms and models to personalize travel recommendations and optimize travel planning. It requires abstract thinking and originality to design and implement effective solutions.

P6 (Extend of Stakeholders)

Involve diverse groups of stakeholders with widely varying needs. Our project considers the needs and requirements of diverse stakeholders, including travellers, travel service providers, and the broader travel industry. It aims to balance and accommodate the varying needs of these stakeholders to deliver a valuable and comprehensive solution.

5.5.3 Engineering Activities

Within this section, we furnish a comprehensive map of engineering activities, further enhancing clarity and context by including dedicated subsections for each mapping's rationale. (Use Table 5.4).

A1 Range of resources	A2 Level of Interaction	A3 Innovation	A4 Consequences for society and environment	A5 Familiarity
✓	✓	✗	✓	✗

Table 5.4: Mapping with complex engineering activities

A1 (Range of Resources)

In our system, there are several implications for both society and the environment. We've implemented various enhancements to benefit travelers. Conversely, the visitation of popular tourist destinations appears to exert an influence on both our society and our nation. Furthermore, by optimizing vehicles, we contribute to a reduction in the carbon footprint on the environment.

A2 (Level of Interaction)

Our system has both societal and environmental implications. We've implemented enhancements for travelers within our system. Conversely, visiting popular tourist destinations appears to impact our society and nation. Furthermore, through vehicle optimization, we contribute to reducing the carbon footprint on the environment.

A4 (Consequences for Society and the Environment)

Our system has implications for both society and the environment. We have incorporated enhancements to benefit travellers within our system. Conversely, the act of visiting popular tourist destinations appears to impact our society and nation. Additionally, through our vehicle optimization efforts, we contribute to the reduction of the environmental carbon footprint.

5.6 Summary

Within the Standards and Design Constraints chapter, we have outlined our adherence to various standards, focusing on software standards. Subsequently, we presented a series of design constraints encompassing economic considerations, environmental factors and sustainability aspects. We also conducted a preliminary cost analysis and delved into the intricacies of complex engineering issues, including knowledge profiles, complex problem-solving and engineering activities. Finally, in Chapter 6, we encapsulated our findings and conclusions.

Chapter 6

Conclusion

In this chapter, we have discussed the summary, limitations and future work.

6.1 Summary

In this thesis, we presented the Guide Me Right project, which aims to enhance the travel experience by providing personalized recommendations for destinations, attractions, accommodations and local events. Through a user-centred approach, continuous feedback and iterative development, we have designed a comprehensive travel planning application. The project emphasized user preferences and leveraged intelligent algorithms to offer tailored travel suggestions. Users can interact with a chatbot, search for destinations and select nearby accommodations. The application integrates real-time information and provides a seamless travel planning experience.

6.2 Limitation

While Guide Me Right offers significant advantages for travellers, it also comes with certain limitations:

1. Dataset: We were limited to our dataset as we had to make the dataset by own.
2. Connect to the Service Provider: Interacting with the service providers was tough for us. SO we just ready our software and set a demo service provider. When we can get contact with them then we can add the this to the system.
3. APIs Limitation: Limitations of API was like weather, event update suffered us lot.

6.3 Future Work

The Guide Me Right project lays a strong foundation for personalized travel planning. To further enhance its capabilities and address limitations, we propose the following areas for future work:

- Search Filter: We would like to improve our system not only for tourist but also for general user so that they can enjoy the accommodation search for their multiple place.
- Reviews: Increasing reviews system will help the user for their better expectations.

In conclusion, Guide Me Right represents a significant step forward in the realm of travel planning applications. While it has its limitations, the project's commitment to user-centred design and a comprehensive feature set positions it as a valuable tool for travellers worldwide. Future work will focus on further refinement and expansion to provide an even more enriching travel experience.

References

- [1] Nelson C Modeste et al. The impact of growth in the tourism sector on economic development: the experience of selected caribbean countries. *Economia Internazionale/International Economics*, 48(3):375–385, 1995.
- [2] Laurel Van Horn. The united states: Travellers with disabilities. *Best practice in accessible tourism: Inclusion, disability, ageing population and tourism*, pages 65–78, 2012.
- [3] Haymontee Khan, Noel Mannan, Shahnoor Chowdhury Eshan, Md Mustafizur Rahman, KM Mehedi Hasan Sonet, Wordh Ul Hasan, and Rashedur M Rahman. Tourist spot recommendation system using fuzzy inference system. In *2017 13th International Conference on Natural Computation, Fuzzy Systems and Knowledge Discovery (ICNC-FSKD)*, pages 1532–1539. IEEE, 2017.
- [4] Karya Gunawan and Bambang Eka Purnama. Implementation of location base service on tourism places in west nusa tenggara by using smartphone. *IJACSA (International Journal of Advanced Computer Science and Applications)*, 6(8), 2015.
- [5] Harikrishna Madhavan and Rajat Rastogi. Social and psychological factors influencing destination preferences of domestic tourists in india. *Leisure Studies*, 32(2):207–217, 2013.
- [6] Research and study. <https://docs.google.com/spreadsheets/d/1xdnDGrt6oLSnQFmCCQAaZ-St1gvK1cYaKan9J6hxKsA/edit?usp=sharing/>. Accessed: [10th August, 2023].
- [7] Travellers' survey form. <https://forms.gle/cS8uRREr2Jpx8r8JA>. Accessed: [5th August, 2023].
- [8] Service providers' survey form. <https://forms.gle/W7Dc3zAXertzuPDu9>. Accessed: [5th August, 2023].
- [9] Xi Cheng. A travel route recommendation algorithm based on interest theme and distance matching. *EURASIP Journal on Advances in Signal Processing*, 2021(1):1–10, 2021.

-
- [10] Jing Lu. Personalized recommendation algorithm of smart tourism based on cross-media big data and neural network. *Computational Intelligence and Neuroscience*, 2022, 2022.
 - [11] Zhixue Liao and Weimin Zheng. Using a heuristic algorithm to design a personalized day tour route in a time-dependent stochastic environment. *Tourism Management*, 68:284–300, 2018.
 - [12] Amarah Shakil and Namrata Maheshwari. A study on customer behaviour towards make my trip. com. In *1 Financial Performance Evaluation of the Construction Industry in India*, page 21.
 - [13] Makemytrip. <https://www.makemytrip.com/>. Accessed: [5th August, 2023].
 - [14] Lu Fan and Wenliang Zhang. Personalized travel recommendation based on the fusion of tgi and poi algorithms. *Wireless Communications and Mobile Computing*, 2022:1–9, 2022.
 - [15] Svein Larsen. Aspects of a psychology of the tourist experience. *Scandinavian Journal of Hospitality and Tourism*, 7(1):7–18, 2007.
 - [16] Wouter Souffriau, Pieter Vansteenwegen, Joris Vertommen, Greet Vanden Berghe, and Dirk Van Oudheusden. A personalized tourist trip design algorithm for mobile tourist guides. *Applied Artificial Intelligence*, 22(10):964–985, 2008.
 - [17] Sajal Halder, Kwan Hui Lim, Jeffrey Chan, and Xiuzhen Zhang. Efficient itinerary recommendation via personalized poi selection and pruning. *Knowledge and Information Systems*, 64(4):963–993, 2022.
 - [18] Mehedee Hassan and Mohammad Zahidur Rahman. Crime news analysis: Location and story detection. In *2017 20th International Conference of Computer and Information Technology (ICCIT)*, pages 1–6. IEEE, 2017.
 - [19] Ashratuz Zavin, Adnan Sharif, Anika Ibnat, Wali Mohammad Abdullah, and Muhammad Nazrul Islam. Towards developing an intelligent system to suggest optimal path based on historic and real-time traffic data. In *2017 20th International Conference of Computer and Information Technology (ICCIT)*, pages 1–6. IEEE, 2017.
 - [20] Compare cheap flights & book airline tickets to everywhere. <https://www.skyscanner.net/>. Accessed: [2nd August, 2023].
 - [21] Tripadvisor. <https://www.tripadvisor.com/>. Accessed: [22nd July, 2023].
 - [22] Google flight. <https://www.google.com/travel/flights/>. Accessed: [22nd July, 2023].
 - [23] Airbnb. <https://www.airbnb.com/>. Accessed: [18th July, 2023].

- [24] Booking. <https://www.booking.com/>. Accessed: [20th July, 2023].
- [25] Expedia. <https://www.expedia.com/>. Accessed: [24th July, 2023].
- [26] Kayak. <https://www.kayak.co.in/>. Accessed: [31st July, 2023].
- [27] Trivago. <https://www.trivago.com/>. Accessed: [26th July, 2023].
- [28] Wander your way. <https://www.wanderyourway.com/>. Accessed: [28th July, 2023].
- [29] Ioannis Refanidis, Christos Emmanouilidis, Ilias Sakellariou, Anastasios Alexiadis, Remous-Aris Koutsiamanis, Konstantinos Agnantis, Aimilia Tasidou, Fotios Kokkoras, and Pavlos S Efraimidis. myvisitplanner gr: Personalized itinerary planning system for tourism. In *Artificial Intelligence: Methods and Applications: 8th Hellenic Conference on AI, SETN 2014, Ioannina, Greece, May 15-17, 2014. Proceedings 8*, pages 615–629. Springer, 2014.
- [30] Ajaya K Tripathy, Pradyumna K Tripathy, Niranjan K Ray, and Saraju P Mohanty. itour: The future of smart tourism: An iot framework for the independent mobility of tourists in smart cities. *IEEE consumer electronics magazine*, 7(3):32–37, 2018.
- [31] Dimitrios Buhalis and Yeyen Sinarta. Real-time co-creation and nowness service: lessons from tourism and hospitality. *Journal of Travel & Tourism Marketing*, 36(5):563–582, 2019.
- [32] Jian-Wu Bi, Yang Liu, and Hui Li. Daily tourism volume forecasting for tourist attractions. *Annals of Tourism Research*, 83:102923, 2020.
- [33] Jira software. <https://www.atlassian.com/software/jira>. Accessed: [5th July, 2023].
- [34] Visual studio code. <https://code.visualstudio.com/>. Accessed: [7th September, 2023].
- [35] Mysql. <https://www.mysql.com/>. Accessed: [7th September, 2023].
- [36] Git. <https://git-scm.com/>. Accessed: [7th September, 2023].
- [37] Github. <https://github.com/>. Accessed: [7th September, 2023].
- [38] Mkdocs. <https://www.mkdocs.org/>. Accessed: [7th September, 2023].
- [39] Software development life cycle. https://www.tutorialspoint.com/sdlc/sdlc_agile_model.htm#:~:text=Agile%20SDLC%20model%20is%20a,product%20into%20small%20incremental%20builds./. Accessed: [22nd July, 2023].
- [40] Ensure sustainable consumption and production patterns. <https://aws.amazon.com/what-is/scrum/#:~:text=Scrum%20is%20a%20framework%20for,agile%20approach%20to%20project%20management./>. Accessed: [22nd July, 2023].

- [41] The 17 goals. <https://sdgs.un.org/goals/>. Accessed: [22nd July, 2023].
- [42] Ensure healthy lives and promote well-being for all at all ages. <https://sdgs.un.org/goals/goal3>. Accessed: [22nd July, 2023].
- [43] Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. <https://sdgs.un.org/goals/goal8>. Accessed: [22nd July, 2023].
- [44] Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. <https://sdgs.un.org/goals/goal9>. Accessed: [22nd July, 2023].
- [45] Make cities and human settlements inclusive, safe, resilient and sustainable. <https://sdgs.un.org/goals/goal11>. Accessed: [22nd July, 2023].
- [46] Ensure sustainable consumption and production patterns. <https://sdgs.un.org/goals/goal12>. Accessed: [22nd July, 2023].
- [47] Strengthen the means of implementation and revitalize the global partnership for sustainable development. <https://sdgs.un.org/goals/goal17>. Accessed: [22nd July, 2023].
- [48] Hypothetical project costing. <https://www.hostinger.com/tutorials/website-maintenance-cost/>. Accessed: [11th September, 2023].