NATIONAL INSTITUTE OF BUSINESS MANAGEMENT

TRANSFER PROGRAM COMPUTER SCIENCE WITH ARTIFICIAL INTELLIGENCE 25.1P

AI PROJECT

PROJECT DOCUMENTATION

SUBMITTED BY

Chalindu Wijekoon	KIC-TPCSAI-25.1P – 031
Chanuka Wanigasekara	KIC-TPCSAI-25.1P - 015
Sumudu Aberathne	KIC-TPCSAI-25.1P - 003
Manjitha Kaluarachchi	KIC-TPCSAI-25.1P – 002

DATE OF SUBMISSION: 08/02/2026

Ai Project

Table of Contents

Table of Figures

Ai Project

Acknowledgment

I would like to express our gratitude to our supervisor Prof. Roshan Dharshana Yapa for his guidance support, and valuable insights throughout this Ai Project module

1. Problem Introduction

Sri Lanka is known as one of the best tourist destinations around the world. Sri Lanka is famous for beaches, wildlife safaris, heritage sites and hill country landscapes (Wikipedia, n.d.). Annually around 1.5 million tourists visit Sri Lanka and in last year it broke the record for the most number of tourist visits by reaching over 2.3 million (Wikipedia, n.d.). But currently, travelers faces a problem of finding the perfect destination that matches their preferences. Most of the existing travel platforms promote more famous destinations rather than promoting hidden gems. Now travelers might need to use different platforms for different services to plan an trip. This makes the travelers spend more time on planning a single trip. The first time visitors are also faces troubles of finding a suitable destination because of lack knowledge and must rely on popular destinations that many platforms recommend.

2.Proposed Solution

To solve this problem we have designed **TripNest** which is a travel recommendation system web app that can provide personalized destination recommendations across Sri Lanka with relevant details, routing plans, and downloadable travel plans. This system can helps travelers transform from traditional travel planning into an efficient, smart, and personalized experience.

Features

- Query based personalized recommendations
- Top 10 destinations + 10 hidden gems
- Destination cards with images and booking links
- Map visualization
- Route planner
- PDF travel plan generation

Key Technologies

- **Main Model:** Google Gemini Embeddings (api-text-embedding-004)
- **Fallback Model:** SBERT (all-MiniLM-L6-v2)
- **Frontend:** React.js, Tailwind CSS, Leaflet.js, MapTiler
- **Backend:** Python, Flask
- **PDF Generation:** FPDF, html2canvas

Ai Project

3. Scope and Objectives

Objectives

- Provide personalized destination recommendations using Google Gemini API as the main model with SBERT as a fallback.
- Helps users to discovery of top destinations and hidden gems
- Support route planning using Haversine distance
- Generate downloadable PDF travel plans
- Provide offline fallback recommendations

Scope

- Focused on Sri Lankan tourism
- Provides personalized travel suggestions based on user queries and selected categories
- Interactive maps and visualization
- Support offline access using the fallback model
- Travel planning and documentation support

4. Literature Review and Research Gaps

Before developing a tool it is useful to perform a literature review because it helps to understand the existing solutions and the gaps present in the real world. For this project we have examined 3 research papers and existing systems to identify the gaps in the tourism recommendation industry.

Research papers

1.PathRec: Visual Travel Recommendation System (2021)

In PathRec research it mainly focuses on helping users explore travel routes using interactive maps, stacked bar plots, and radar charts. The system aims to make route selection and destination comparison easier through visual cues (Chen, D, et al., 2017).

2. Travel recommendation system for Sri Lankan tourist based on Hybrid-Neural Collaborative Filtering (2024)

This study focuses on the use of hybrid machine learning models combined with AGNES clustering, Genetic Algorithms, and Neural Collaborative Filtering to provide personalized recommendations for tourists in Sri Lanka (Abeysekare, E.M.N. & Jayetileke, H.L., 2024).

By Reviewing these research papers we identify 2 main point. The Importance of visualizing travel information's other than recommending destinations only and the importance of developing hybrid model to improve accuracy of the recommendations.

Existing Travel Platforms and Gaps

The main travel platform TripAdvisor has a new recommendation tool that allows users to search for the city they want, select the tourist category and then based on those inputs it recommends places on a map with the details. This system mainly focuses on popular destinations but doesn't provide any personalized plans. Also, other platforms like Google Travel, Kayak Explore, Expedia, and Booking.com suggest destinations and trips based on trends or past user searches, or these platforms might be specific for certain services like hotel bookings, flight reservations, or tour packages.

These studies helped us to develop TripNest, combining visual interaction, hybrid recommendation techniques, and semantic embeddings to provide a more effective and user friendly travel planning system.
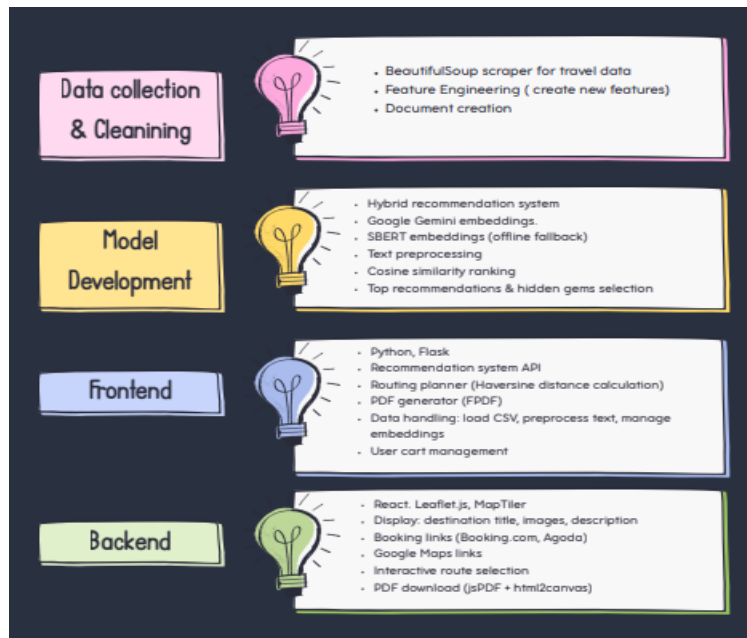
Ai Project

5. System Architecture

Figure 1: Project Architectureure

6. Data Collection & Preparation

The data collection process was started by a manually created dataset with destination names, number of reviews and the TripAdvisor link for each destination. This base dataset was helpful to identify and drop the destinations that had no reviews on TripAdvisor. Then a data scraper was built using BeautifulSoup to collect the details of each destination such as images, overall rating, user reviews, reviewer categories, reviewer name, reviewer location and reviewer dates.

After extracting the data from the data scraper separate Csv files were generated for each destination from the scraper with 236 destinations. Then each dataset was cleaned by removing null values and duplicates. Then the dataset was down sampled where destinations with more than 500 reviews were down sampled to a limit of 250. This downsampling helps to manage the balance of the dataset.

After finishing the data cleaning process, feature engineering was applied to create new features that are helpful for building the system. The feature are image links, Booking.com links, Agoda links, latitude and longitude coordinates, and Google Maps links. All the reviews for each destination were merged into a single column called document text and a document style Csv file was created which helps for model development.

Ai Project

7. Model Development

Mainly the TripNest recommendation system is based on the hybrid approach of artificial intelligence in providing personalized travel recommendations. The system is based on the 2 main models Google Gemini embeddings API (text embedding-004) as the main model while the SBERT Model was used as an fallback model.

The process of developing a model requires the following steps to be executed. The process starts by loading the clean dataset. The text is preprocessed by making all characters lowercase and removing HTML tags and special characters. Each document is converted to a numerical representation using Google Gemini and SBERT. Once a query is entered by a user, a corresponding query embedding is made, and similarity is calculated using the cosine function. The system selects the top 10 destinations and top 10 hidden gems where hidden gems are calculated using an equation for the destinations with a total number of reviews less than 50. The above combination of using a hybrid model makes TripNest a system that is able to deliver results through a combination of online availability and reduced dependence on connectivity.

8. Backend

The TripNest back end is built using Python with Flask to support communication with the front end through APIs. There are 4 main features that was develop on the backend each parts handle different parts of the application.

1.Search & Recommendation Engine

2. Map Data Preparation

3. Routing Planner

4. Travel plan PDF Downloader

1. Search & Recommendation Engine
The Search engine receives user queries, generates embeddings, compares them with destination data and ranks locations based on semantic similarity. It also applies the hidden gem filter to highlight less popular destinations that still match the user's interests.

2. Map Data Preparation
Map Data preparation module prepares destination data for map display. It structures latitude and longitude values, images, and destination links so they can be shown correctly on the interactive map. This allows the map to display all locations clearly and in the correct positions.

3. Routing Planner
The Routing planner uses the destinations selected through the "Add to Cart" feature as input. It

Ai Project

extracts their coordinates and calculates distances using the Haversine formula. A nearest neighbor method is then used to decide the visiting order, helping reduce travel distance and time while producing a practical route plan.

4. Travel Plan PDF Downloader
This system creates a travel plan in PDF format based on the selected destinations. The document includes booking links, Google Maps links, and the suggested travel route. A pre designed cover page and end page are added to give the document a clear and structured layout.

9. Frontend

The frontend of TripNest is developed using React.js which allows for a dynamic and responsive user interface, while Tailwind CSS provides consistent styling and layout across devices. The system is structured around two main pages: the Home page and the Recommendation page.

The **Home page** is organized into four distinct tabs:

- **Home Tab:** Introduces the system and explains its purpose to users.
- **Body Tab:** Presents the main content, describing key features and functionalities of the application.
- **About Us Tab:** Showcases information about the project and the development team.
- **Footer Tab:** Provides useful links and additional system information.

The Recommendation page serves as the primary hub for user interaction. It includes a search engine for querying destinations, destination cards displaying images and detailed information, and an Add to Cart feature that allows users to select destinations for planning their trips. An interactive map built with Leaflet.js and MapTiler helps users visualize locations geographically. The page also includes a route planning section that calculates the optimal visiting sequence and a PDF download feature for offline travel plans. The frontend is designed to provide a smooth and intuitive user experience, enabling travelers to explore destinations, plan efficient routes, and organize their trips seamlessly. The combination of interactive visual elements and structured navigation ensures that users can engage with the system in a clear and user-friendly manner.
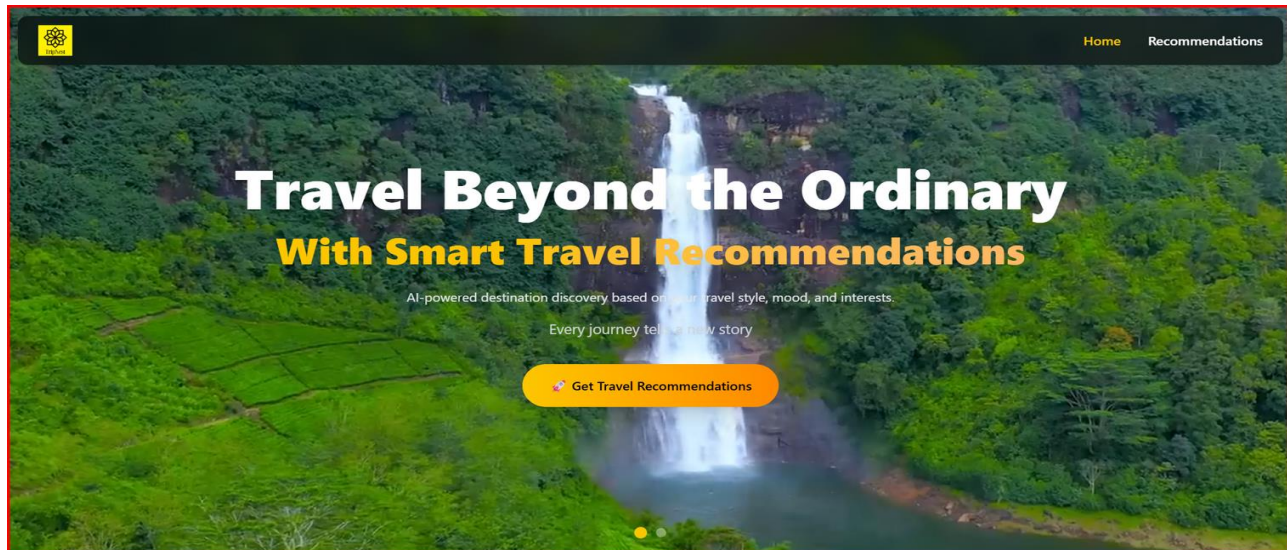
Ai Project

Home page

Figure 2 : Home Page image

Body Tab
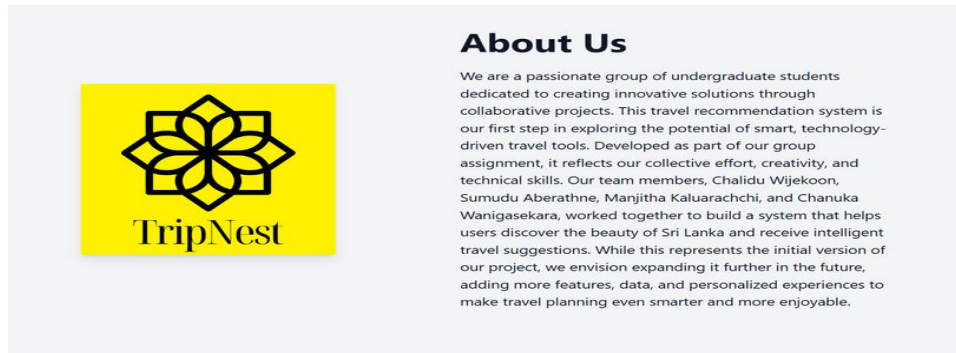

Figure 3 : Body tab image

About us tab

Figure 4: About us Tab Image

Footer tab
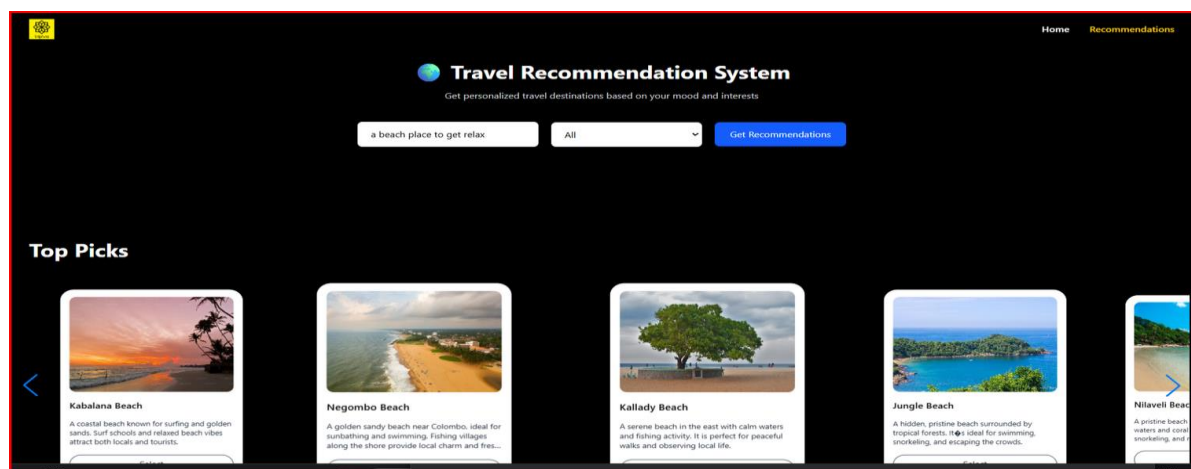

Figure 5: Footer tab image

Recommendation Page
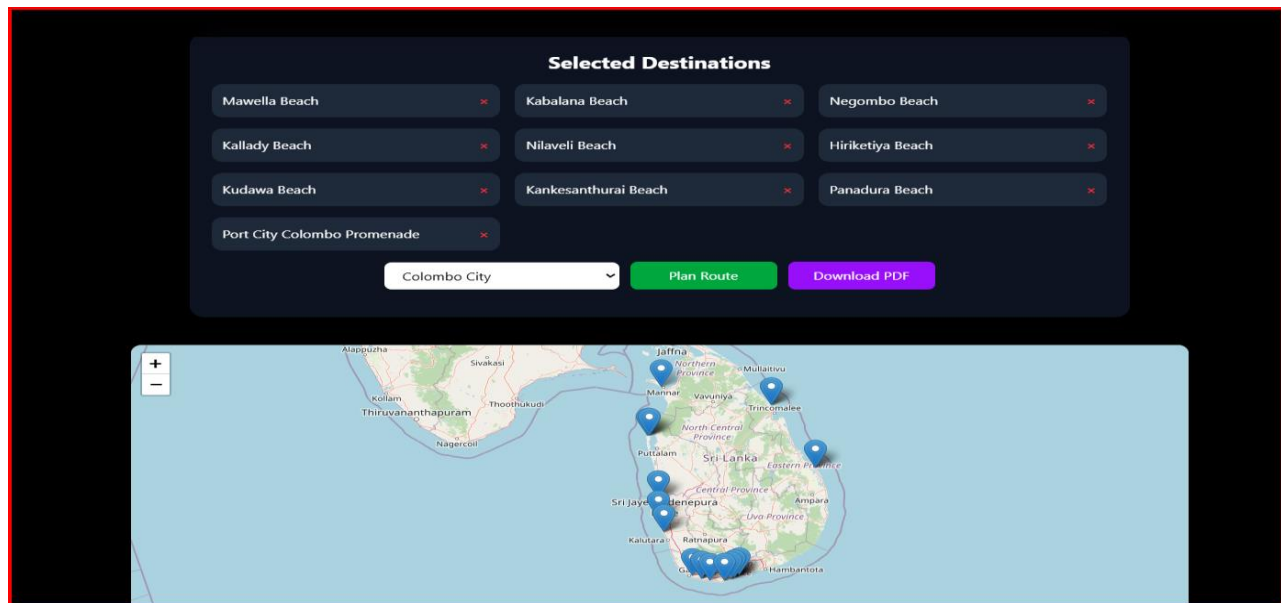

Figure 6 : Recommendation page image

Ai Project

Selected destination feature

Figure 7: Selected destination feature tab image
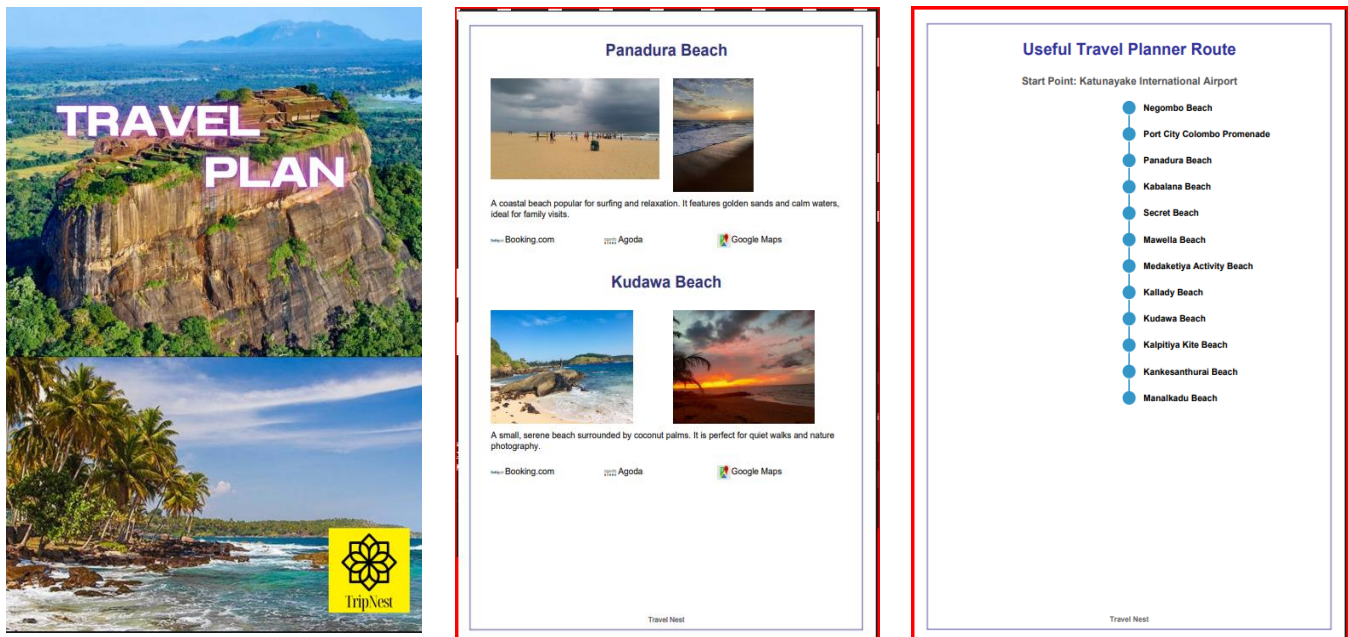
PDF of Travel Plan

Figure 8 : Tavel PLan PDF image

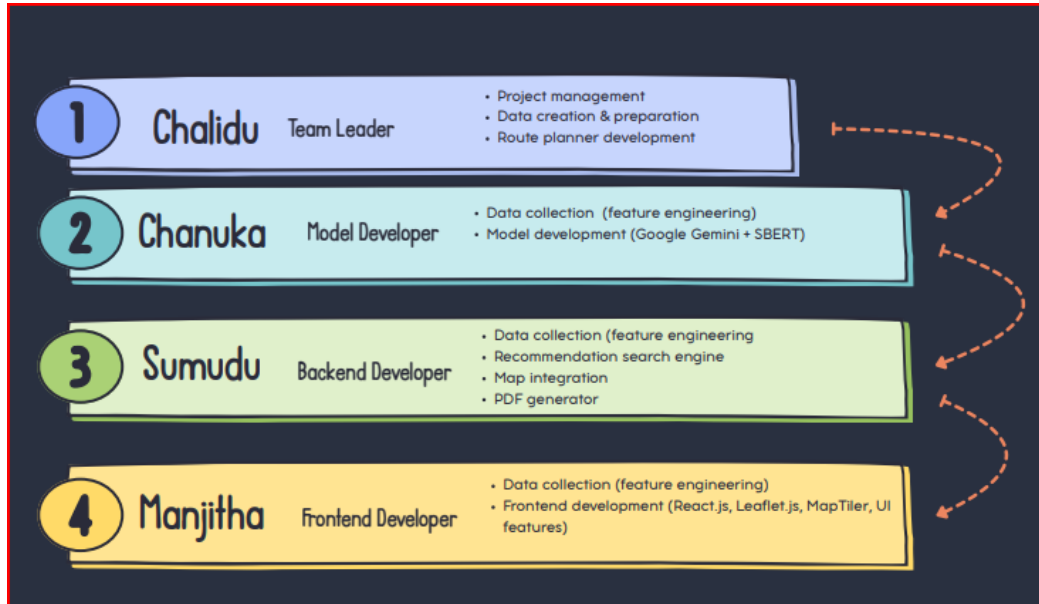Ai Project

10. Team Roles

Figure 9: Team Role image

11. Future Plans

For continuing this system further we have planned some future plans that need to be improved in the future. Since the current system only relies on TripAdvisor reviews and only has 226 unique destinations we would like to expand the dataset by collecting more destinations from different platforms and cover most of Sri Lanka within a short period. And also we would like to develop the model training process and update the Gemini API to a paid service or study different research papers and apply those model training steps and develop a better version. Also to make the reviews update with new reviews we would like to manually scrape data each month or build a kind of an agent to scrape data daily or weekly to make the system more updated. Also we would like to add and improve our features like the routing planner system by enabling real street route planning and day-wise route suggestions, and expand the planner for better planning. Make the PDF downloadable planner better and update the map with 3D viewing using Google Map API, and expand the system for real-world large-scale usage and future development.

12. Conclusion

This report is about our AI project for the bridging course. In the report we discussed our project the problem we identify, our solution, literature research we conducted, existing tools, identified gaps, the system architecture, team roles and the process of each parts. TripNest addresses the challenges faced by travelers in planning trips across Sri Lanka by providing personalized recommendations, hidden gem discovery, optimized route planning, and downloadable travel plans. The project demonstrates the practical application of hybrid recommendation models and interactive visualizations in tourism. With the planned future enhancements, TripNest has the potential to evolve into a more comprehensive tool that can support a wider range of destinations and provide an even smarter travel experience.

13. References

Abeysekare, E.M.N. & Jayetileke, H.L., 2024. *Travel recommendation system for Sri Lankan tourist based on Hybrid-Neural Collaborative Filtering*. Srilanka, University of Kelaniya.

Chen, D, et al., 2017. *PathRec: Visual Analysis of Travel Route Recommendations*. New York, ACM (Association for Computing Machinery).

Wikipedia, n.d. *Tourism in Sri Lanka*. [Online]
Available at: https://en.wikipedia.org/wiki/Tourism_in_Sri_Lanka?
[Accessed 09 02 2026].