Safar

Project Team

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Chapter 1

Introduction

The purpose of the document is to outline the development, objectives and scope of Safar, a tourism application that aims to enhance travel planning experience for users interested in visiting location in Pakistan. The documents aims to provide clear understanding of the project, including application background and values offered to its users and stakeholders. It further accomplishes to address application scope and features, technology stack, and timeline for each module.

Tourism in Pakistan has grown significantly in the recent years, driven by its rich culture, historic locations, and diverse landscape. Despite the increase, there is a lack of a modern application that help users with a personalised itinerary based on their budget, visualise destinations, and efficiently plan their trips.[1].

1.1   Problem Statement

Tourists in Pakistan frequently struggle to find reliable and engaging information about various tourist spots and navigate through local attractions. Existing platforms often fall short by lacking interactive and immersive experiences, which hinders their ability to engage users and sustain their interest. Key aspects of tourism, such as comprehensive trip planning, curated itineraries, real-time assistance, and accurate navigation, are either missing or fragmented across multiple sources, making it difficult for users to take full advantage. This lack of up-to-date information often results in travelers being disappointed when destinations don't align with their expectations.

1.2 Motivation

Motivation behind Safar comes from need of addressing the issue that travellers face in Pakistan. Existing platforms provide fragmented and outdated information making it difficult for users to plan their trips or discover new locations. Northern Pakistan is a place where heaven meets Earth. But lack of visuals of these locations with seasonal changes does not do justice to tourists. Our aim is to provide travellers with 3D visuals of every location with the reflection of their seasonal changes so users can truly see Pakistan and its beautiful landscapes. We hope to achieve a boost in both national and international tourism through our application.

1.3 Problem Solution

Our application, Safar, aims to offer an innovative and modern solution by consolidating all user needs into a single platform. The primary objective of Safar is to assist travelers in planning and executing their trips more efficiently and offering immersive previews of locations to set accurate expectations and boost overall tourism activity. Safar will feature a comprehensive trip planner and AI-generated 3D environments of various tourist locations, enhancing tourist engagement and providing users with up-to-date information about their desired destinations. The platform will also include a real-time chat-bot to address user queries, ensuring a seamless and interactive experience.

1.4 Stake Holders

The key stakeholders for the Safar project are:

- **Tourists**: Those who use the application to search for the new places, to use for planning a trip or to explore some locations with the help of 3D visualization in case of both domestic and international travelers.

- **Tourism Boards**: Such as Pakistan tourism department and regional offices that is responsible for the introduction and development of the tourism in province and country respectively.

- **Local Businesses**: Hospitals, hotels, restaurants, local tour operators, ground transportation services, and certain other organizations that are likely reap the benefits of a larger number of tourists, which the app's clients pool will bring to the country.

- **Government Authorities**: Tourism stakeholders such as governmental organizations in charge of tourism promotions and policies to ensure that Safar complies with the country's tourism master plans and other infrastructural master plans.

- **Environmental Agencies**:Local based non governmental organizations (NGOs) and environmental agencies interested in tourism sustainability and environmental conservation.

- **Travel Bloggers and Influencers**: Users who create mobile contents such as reviews, photos and itineraries and assist in the promotion of the app among their friends.

- **Media and Advertising Partners**: Brands which can join with for marketing campaigns and help promote the platform.

Chapter 2

Project Description

The following section of the proposal highlights the most important section, which includes scope of the project, functionalities sorted in relevant module, and implementation of each module divided into members and timeline.

2.1   Scope

The scope of Safar includes an interactive web and mobile application that enhances travel planning for users interested in exploring destinations in Pakistan. The core functionality is to provide users with a virtual experience by using 3D scene of the destination created from 2D images. These images will go through 3D Gaussian splatting to create an immersive 3D scene. This feature will give users an ability to visualize and make a decision before they plan their trip.

Additionally, Safar allows users to create a personalized itinerary based on their budget, preference, and duration of stay. The itinerary provided will also allow users to further customize by considering their preference of activities or destination, suggesting the best possible itinerary for their trip.

Furthermore, inclusion of Gamification in our application allows user to earns points or rewards which will motivate users to engage more frequently (later on can be used to provide user with discounts or coupons). Safar will also be able to handle user queries on any of their upcoming trips or destination they are planning to visit using an AI-powered chat-bot.

2.2   Modules

Following are the modules involved in our final year project.

2.2.1 Web Application

The Safar web application is aimed at the users to interactively create, modify, and arrange their journeys. Additional possibilities are provided for trip arrangements, budget control, booking of the location and the accommodation as well as providing 3D views of the tourist attractions. As more advanced features content generation and web based communication with chat-bots are also applied resulting in customization and navigability of the content and feedback among the users improving both foreign and domestic tourism.

1. User Registration and Profile Management

2. Trip Planner

3. 3D Environment and Location Visualization

4. Real-Time Chatbot

5. User-Generated Content and Reviews

2.2.2 Mobile Application

Safar mobile application stands as a solution to the travelers where in one can plan, explore and handle their trips while they are on the move. Travelers can design their trips in full feature by planning for possible attractions to be visited in the country using the mobile application's capabilities such as customized itinerary, electric alerts, navigation and application of virtual reality technology to present prospective tourist sites before physical visit. Besides, the app helps them understand difficult procedures and provides real time communication with the client via interactive software for local and overseas users.

1. User Registration and Profile Management

2. Mobile Trip Planner

3. Real-Time Notifications and Updates

4. GPS and Offline Navigation

5. 3D Location Preview

6. Chatbot Integration

7. User Reviews and Photo Sharing

2.2.3   3D Scene Generator

The 3D Scene Generator module applies the use of innovative AI based systems in generating real-world 3D images of tourist sites and these are made available for users in a virtual way. If features for example rotating the view dynamically, changing the seasons, and rendering images of the location in very realistic manner are provided to the users they get to enjoy the locations.

1. AI-Powered 3D Scene Generation

2. Dynamic Seasonal and Time-based Changes

3. Interactive Exploration

4. Real-Time Rendering

5. Location-Based Accuracy

6. Low-Latency Performance

2.2.4   Chat-Bot

The module of Chatbot offers users instant, AI-based assistance by delivering immediate responses and tailored suggestions as they plan a trip.

1. Interactive Travel Assistance

2. Natural Language Processing (NLP)

3. Multilingual Support

4. Integration with Trip Planner

5. 24/7 Availability

6. User Feedback and Query Handling

2.2.5   Trip Planner

Trip Planner is a feature-rich module to plan travel experiences, allow users create and customize itineraries according to their interest deciding itinerary type (favorites from available places) or budget.

1. Customized Itineraries

2. Budget Management

3. Accommodation Recommendations

2.2.6 Gamification

Users want to be more connected with the things they love, this module is all about providing an Interactive and fun travel experience! The app is designed such that users earn badges on unlocking destinations, completing itineraries or participating in location-based challenges.

1. Badges and Rewards

2. Challenges and Leader boards

3. Achievement Tracking

4. Social Sharing of Achievements

2.3 Tools and Technologies

Several tools and technologies will be used to ensure Safar is efficiently developed, deployed and managed. Below is an overview of key tools and technologies to be used in this process.

2.3.1 Python

Python will be used as a primary language for handling the data. Having an extensive library support, particularly openCV will allow image processing before and while the 3D transformation.

2.3.2 TensorFlow & PyTorch

Finally TensorFlow will deal with the heavy lifting of training a model, real-time 3D rendering and ensuring everything is portable across different platforms. We will do the development and fine-tuning of AI stuff (e.g.,the chatbot, personalized trips recommendations) using PyTorch .

2.3.3   COLMAP

When it comes to tourist spots, this should make it possible to create detailed and accurate 3D models of the surroundings from 2D pictures using COLMAP. This service handles and lines up many images to build detailed 3D versions that can help make a lifelike, photo-based 3D scene you can step into.

2.3.4   Flutter

Flutter with dart will be used for developing the mobile application due to its cross-platform compatibility and rich interactive UI configurations. It's performance benefits especially in rendering custom graphics align perfectly with our 3D virtual tour element.

2.3.5   React & Three.js

React will be used for creating the front-end of the web application due to its component based architecture along with Three.js for rendering 3D elements in the web.

2.3.6   Flask

Flask will be used for creating the back-end of the web for synchronization with AI models.

2.3.7   Git & GitHub

Git and GitHub will serve as primary version control and collaboration platforms.

2.4   Work Division

Following is the division between our team.

2.5   Timeline

Following is the timeline for the project divided into four iterations.

Table 2.1: Work Division Among Team Members

Name	Registration	Responsibility/ Module / Feature
Mr. Haider Mansoor	21i-2576	(Module 1- Feat 1-3) Web Application
Team Effort	Team	(Module 2- Feat 1-7) Mobile Application
Team Effort	Team	(Module 3- Feat 1-6) 3D Scene Generator
Mr. Bilawal Cheema	21i-0347	(Module 4- Feat 1-4) Chatbot
Mr. Awais Malik	21i-0539	(Module 4- Feat 5-6) Chatbot
Mr. Haider Mansoor	21i-2576	(Module 5- Feat 1) Customizable Itineraries
Mr. Awais Malik	21i-0539	(Module 5- Feat 2-3) Trip Planner
Mr. Awais Malik	21i-0539	(Module 6- Feat 1-2) Badges, Rewards and Leaderboards
Mr. Bilawal Cheema	21i-0347	(Module 6- Feat 4) Social Sharing of Achievements

Table 2.2: Project Timeline

Iteration#	Time frame	Tasks/Modules
01	Sept-Oct	Preprocessing, Chatbot, UI/UX
02	Nov-Dec	3D Environment, Trip Planner, UI/UX
03	Jan-Mar	3D Environment Enhancement, Gamification, Cross Platform
04	Apr-Jun	API Integration, Testing, Launch

Bibliography

[1] A Kolyshkin and S Nazarovs. Stability of slowly diverging flows in shallow water. *Mathematical Modeling and Analysis*, 2007.