Project Report On

Location Finder

"A dissertation submitted in partial fulfillment of the requirements of Bachelor of Technology Degree in Computer Science and Engineering of the Maulana Abul Kalam Azad University of Technology for the year 2022-2023"

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Certificate of Approval

This is to certify that this report of B. Tech. Final Year project, entitled **"Location Finder"** is a record of bona-fide work, carried out by **Anushree Saha, Manish Pathak, Shivam Mishra** under my supervision and guidance.

In my opinion, the report in its present form is in partial fulfillment of all the requirements, as specified by the ***Regent Education and Research Foundation*** and as per regulations of the ***Maulana Abul Kalam Azad University of Technology***. In fact, it has attained the standard, necessary for submission. To the best of my knowledge, the results embodied in this report, are original in nature and worthy of incorporation in the present version of the report for B. Tech. programme in Computer Science and Engineering in the year 2022-2023.

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PROJECT SYNOPSIS

The Location Finding App with Image EXIF Data is a unique application that allows users to find the location and route of a place by simply uploading an image with EXIF data. The objective of this project is to create a platform that works similarly to Google Maps but with the twist of using an image as input instead of text.

The project aims to utilize the EXIF data available in the image to extract essential information such as altitude, longitude, and latitude. This data would be used to determine the location and route of the place, making it easier for users to find their way without having to type in the place name.

The project's scope includes developing a user-friendly interface that allows users to upload images with ease and a robust algorithm that extracts the required information from the EXIF data. The application will be built using the Agile Software Development methodology, ensuring that it is flexible and adaptable to changing requirements.

In terms of technical feasibility, the project's algorithm will be based on well-established image processing techniques, ensuring that it is efficient and accurate. The operational feasibility of the project will be ensured by conducting rigorous testing before deployment to ensure that it meets the user's requirements.

Overall, the Location Finding App with Image EXIF Data is an innovative project that has the potential to revolutionize the way we find locations and routes.

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1. INTRODUCTION

The Location Finding System with Image EXIF Data is an innovative and exciting project that aims to simplify the process of locating places using images. This system works similarly to Google Maps, but the interesting part is that it uses an image as an input instead of text. Generally, we type a place name and search for its location and route, but this system takes it one step further by allowing users to use an image with EXIF data to find the location or route of a place.

The system is designed to be user-friendly and easy to navigate. The user interface is simple and intuitive, making it easy for users to upload their images and find the location of the place in question. The system uses an algorithm that can extract the necessary information from the EXIF data of the image and use it to locate the place. The system can also display the route to the place, making it easy for users to get directions.

The project is aimed at providing a convenient and efficient way for users to locate places using images. The system is intended for use by individuals who may have difficulty finding a place by name or may not know the name of the place at all. It is also intended for use by tourists who may be unfamiliar with a particular area and need to find their way around.

The project is significant because it provides a novel and innovative solution to a common problem. It addresses the limitations of existing location finding systems that rely solely on text input and provides a new way for users to interact with the system. The system uses cutting-edge technology to extract information from the EXIF data of images, making it a reliable and accurate way to locate places.

The project's scope is vast and far-reaching, with potential applications in a wide range of industries and fields. The system could be used by law enforcement agencies to locate missing persons or by disaster response teams to identify areas that need assistance. The system could also be used by marketing firms to track consumer

behavior or by social media companies to locate posts based on the location of the image.

The project's feasibility has been established through a thorough analysis of the technical, operational, and economic aspects of the project. The technical feasibility of the project has been established by examining the technology used in the system and ensuring that it is both reliable and accurate. The operational feasibility has been established by examining the system's ease of use and ensuring that it is user-friendly. The economic feasibility of the project has been established by examining the costs associated with developing and maintaining the system and ensuring that it is cost-effective.

Location-based apps have become a ubiquitous part of our daily lives, but the traditional process of inputting text-based queries to find locations can be cumbersome and time-consuming. Our project seeks to introduce a more efficient and intuitive method for location finding by utilizing image-based queries with the added benefit of exif data. By using images that contain embedded exif data, our app will be able to extract valuable information such as the exact location, date, time, and other relevant details. This will allow for a much more accurate and streamlined location-finding process that can be tailored to the user's specific needs. Additionally, our system will use advanced image recognition algorithms to accurately identify landmarks, buildings, and other points of interest in the image, making it even easier to find the desired location. Through our project, we aim to provide a cutting-edge location-finding app that utilizes the latest in image recognition technology and exif data to make location finding more efficient, accurate, and user-friendly than ever before.

In conclusion, the Location Finding System with Image EXIF Data is an innovative and exciting project that has the potential to revolutionize the way we locate places using images. The system is user-friendly and easy to use, making it accessible to a wide range of users. The project's feasibility has been established, and the project has been developed using a range of tools and technologies. The system's potential

applications are vast, making it a valuable and significant project that could have far-reaching impacts.

1.1 Objective:

The objective of this project is to create a platform that can find the location and route of a place using an image as input instead of text. The traditional way of searching for a location or route is by typing the name of the place into a search engine, but this project takes it to the next level by allowing users to upload an image with embedded EXIF data, which contains essential information such as altitude, longitude, and latitude. The project aims to leverage this data to locate the place and plot the route to the destination.

The primary objective is to provide users with an alternative and innovative way to search for a location and its route. The traditional method of searching for a location can be cumbersome, especially if you are not sure of the exact spelling of the place's name. In contrast, using an image as input is more intuitive, and users can quickly identify the location on a map using the image as a reference. Additionally, the project's use of EXIF data provides a more accurate and efficient way of locating the place, as it contains essential information such as GPS coordinates and altitude.

Another objective of this project is to improve the user experience and provide an intuitive and easy-to-use platform. The platform is designed to be user-friendly, with a simple and straightforward interface that allows users to upload an image and obtain the location and route information. The project aims to eliminate any unnecessary complexities and provide a seamless experience for the user.

Lastly, the project's objective is to provide a reliable and accurate platform for location and route searching. The use of EXIF data and advanced algorithms ensures that the location and route information provided to the user is accurate and up-to-date. The platform is designed to be scalable, allowing it to handle a large volume of requests without compromising on performance and accuracy.

Overall, the objective of this project is to provide users with an innovative, intuitive, and reliable platform for location and route searching using an image as input. The project aims to improve the user experience and eliminate any unnecessary complexities associated with traditional location searching methods. Additionally, the project aims to leverage advanced technologies such as EXIF data and advanced algorithms to provide accurate and up-to-date location and route information to the user.

1.2 Scope of the system:

Here are some potential scopes for the project:

1. Integration with other image-based technologies: This platform could potentially be integrated with other image-based technologies, such as facial recognition, to create a more sophisticated and personalized user experience.

2. Expansion into other industries: While the initial focus of the project may be on tourism and transportation, there are many other industries that could benefit from this platform, such as real estate, architecture, and environmental studies.

3. Collaboration with mapping and navigation companies: Collaboration with existing mapping and navigation companies could expand the platform's reach and capabilities.

4. Implementation of augmented reality: The integration of augmented reality technology could allow users to view locations in a more immersive and interactive way.

5. Improving accuracy through machine learning: The platform could incorporate machine learning algorithms to improve the accuracy of location and route suggestions, making it even more valuable to users.

Overall, the scope of the project could be quite broad, with many potential avenues for expansion and collaboration.

1.3 Feasibility Study:

A feasibility study is a critical component of any project, including the development of location finding apps with image EXIF data. The feasibility study examines the technical, operational, and economic feasibility of the project.

Technical feasibility: The technical feasibility study evaluates whether the technology required for the project is available and whether it can be implemented efficiently. In the case of this project, technical feasibility will involve examining whether the required image processing algorithms and EXIF data extraction tools are available and can be integrated into the system seamlessly.

Operational feasibility: The operational feasibility study examines whether the project can be implemented and integrated into the existing processes without disrupting the workflow. This involves analyzing whether the target users will be comfortable using the system and whether there are sufficient resources available to support the system.

Economic feasibility: The economic feasibility study evaluates whether the project can generate sufficient revenue to cover the costs of development and ongoing maintenance. This includes conducting a cost-benefit analysis to determine whether the potential benefits of the system justify the development and maintenance costs.

Overall, a feasibility study will help to determine whether the project is worth pursuing and will help to identify any potential risks or issues that need to be addressed before proceeding. By conducting a comprehensive feasibility study, the project team can make informed decisions about whether to proceed with the development of the location finding app with image EXIF data and can develop an effective project plan to ensure its success.

1.3.1 Technical Feasibility

The technical feasibility of this project largely depends on the availability and accuracy of the image recognition technology and the exif data extraction capabilities of the system.

The image recognition technology must be able to accurately identify landmarks, buildings, and other points of interest in the image to provide relevant location information. This requires a sophisticated algorithm and training data to ensure a high level of accuracy.

The exif data extraction capabilities of the system must also be robust and reliable to accurately retrieve the necessary location information from the image's metadata.

This requires the system to have access to comprehensive exif data and to be able to interpret it correctly.

Additionally, the system must be able to efficiently process and store large amounts of image and exif data, as well as respond quickly to user queries. This requires a robust and scalable infrastructure that can handle the volume of data and user traffic.

Overall, while the technology required for this project is complex and sophisticated, it is available and has been successfully implemented in other similar systems. Therefore, with proper planning, development, and testing, the technical feasibility of this project can be achieved.

1.3.2 Operational Feasibility

The operational feasibility of this project depends on a number of factors such as the availability of resources, ease of use for end-users, and the ability to integrate with existing systems.

One of the key operational feasibility factors is the availability of accurate and up-to-date image and location data. This can be achieved through partnerships with established mapping and location data providers, or by developing a proprietary data collection process.

Another important factor is the ease of use for end-users. The system should have a simple and intuitive interface that allows users to easily upload images and retrieve location information. The system should also be able to provide accurate and timely feedback to users.

Integration with existing systems is also important for operational feasibility. For example, the system should be able to integrate with other popular mapping or

location-based applications. This will increase the utility of the system and make it more attractive to users.

Overall, the operational feasibility of this project is largely dependent on the ability to source accurate and up-to-date image and location data, as well as the ability to develop a user-friendly interface and integrate with existing systems. With proper planning and execution, these challenges can be overcome and the project can be successfully implemented.

1.3.3 Economic Feasibility

The economic feasibility of this project depends on several factors such as the development cost, maintenance cost, expected revenue, and potential market demand.

Development cost: The development cost will depend on the size of the development team, the complexity of the system, and the development tools and technologies used. If the project requires the development of custom software and hardware components, the development costs may be significant.

Maintenance cost: The maintenance cost will depend on the complexity of the system and the number of users. Ongoing maintenance may include server hosting, database maintenance, software updates, and customer support.

Expected revenue: The expected revenue will depend on the pricing strategy and the target market. The revenue can be generated through subscription fees, advertising, or by charging users for premium features.

Potential market demand: The potential market demand for the system will depend on the number of users who are interested in using location finding apps with image

EXIF data. The target market could be individuals, businesses, or government agencies.

Overall, the economic feasibility of this project will depend on the balance between the development cost, maintenance cost, and potential revenue. If the development cost and maintenance costs are high, the system may not be economically feasible. However, if the potential market demand and revenue are high, the project could be economically feasible. It is important to conduct a detailed cost-benefit analysis before embarking on this project to ensure its economic feasibility.

2. SOFTWARE REQUIREMENT SPECIFICATION (SRS)

Introduction:

The purpose of this document is to provide a detailed Software Requirement Specification (SRS) for the project on location finding using image EXIF data. The SRS defines the requirements and specifications that are necessary for the development of this project.

Functional Requirements:

1. The system should be able to receive images as input from the user.
2. The system should extract the EXIF data from the image.
3. The system should be able to read the GPS data from the image EXIF.
4. The system should be able to plot the location on the map based on the GPS data.
5. The system should provide the user with the shortest route from their current location to the location of the image.
6. The system should be able to handle multiple images at once.

Non-Functional Requirements:

1. The system should be fast and responsive.
2. The system should be user-friendly and easy to use.
3. The system should be secure and protect user data.
4. The system should be compatible with multiple devices and platforms.
5. The system should be reliable and accurate in its location tracking.

System Architecture:

The system will be developed using a client-server architecture. The client-side will be an application that runs on the user's device and accepts input images from the user. The server-side will be responsible for processing the images and extracting the EXIF data. The server will then use the GPS data to plot the location on a map and provide the user with the shortest route to the location.

Technology Stack:

The project will be developed using the following technology stack:

Front-end:

- HTML: a markup language used to structure and display content on the web
- CSS: a stylesheet language used to describe the presentation of HTML documents
- Bootstrap: a free and open-source CSS framework used to design responsive and mobile-first web pages

Back-end:

- Python: a high-level programming language used for general-purpose programming
- Flask: a micro web framework written in Python used to build web applications

Libraries:

- Pillow: a Python Imaging Library used for opening, manipulating, and saving many different image file formats

Additional functionality:

- Redirect: a function in Flask used to redirect the user to another endpoint

This tech stack allows for the creation of a responsive web application with dynamic functionality and the ability to manipulate and display images. The use of Flask and Python allows for a scalable and robust back-end, while HTML, CSS, and Bootstrap allow for an intuitive and user-friendly front-end. The Pillow library allows for image manipulation, and the Redirect function in Flask allows for easy navigation and routing between different pages of the web application.

Testing:

The system will undergo rigorous testing to ensure that it meets the functional and non-functional requirements specified in this document. The testing will include unit testing and integration testing.

Conclusion:

This SRS document provides a detailed description of the requirements and specifications for the development of the location finding system using image EXIF data. The document will serve as a guide for the development team throughout the software development life cycle.

3. SOFTWARE DEVELOPMENT PROCESS MODEL ADOPTED

For the project on location finding using the image exif data, the software development process model adopted is the Agile methodology. The Agile methodology is a flexible and iterative approach to software development that emphasizes collaboration between cross-functional teams and continuous improvement through the iterative delivery of working software.

Agile development methodology is particularly well-suited to this project as it allows for the fast-paced development of software products that are adaptive to the changing requirements of the users. The Agile approach breaks down the development process into small increments, which are delivered in short sprints, typically two to four weeks in length. This incremental delivery approach allows for regular feedback and stakeholder engagement, which ensures that the product is developed according to the user's needs.

The Agile development methodology also promotes the principle of self-organizing teams, where team members collaborate and take ownership of their tasks. This creates a culture of transparency and shared responsibility, which facilitates better communication, knowledge sharing, and decision-making. Moreover, Agile methodology focuses on delivering a minimum viable product (MVP) that meets the primary needs of the user, which is essential in this project, as the location finding app needs to be simple and easy to use.

The Agile development process model adopted in this project consists of five phases: planning, analysis, design, implementation, and testing. These phases are iterative and overlap with each other to some extent.

In the planning phase, the project objectives are identified, and the project scope is defined. The stakeholders are identified, and their requirements are gathered. The Agile methodology promotes a flexible approach to planning, where the planning is done in small increments and is revisited in each iteration.

In the analysis phase, the requirements gathered in the planning phase are analyzed and prioritized based on their importance to the user. User stories and acceptance criteria are created to define the features of the product.

In the design phase, the software architecture is designed, and the development team identifies the technology stack required to build the product. The design phase focuses on creating a design that is easy to maintain and scalable.

In the implementation phase, the development team starts building the product using the technology stack identified in the design phase. The development team works in short sprints to deliver working software. The Agile methodology encourages continuous integration and delivery, which ensures that the code is tested regularly and is ready for deployment at any point in time.

In the testing phase, the developed product is tested for bugs and defects. The testing is done throughout the development process and in each iteration. The testing phase focuses on ensuring that the product meets the user's requirements and is free from any defects or bugs.

In conclusion, the Agile methodology is the perfect software development process model for the project on location finding using the image EXIF data. The Agile approach promotes flexibility, collaboration, and continuous improvement, which are essential for developing a successful product that meets the user's needs.

4. OVERVIEW

4.1 System Overview

The location finding using image exif data is a project aimed at developing a system that can automatically extract and process location data from images that contain exif metadata. This system can be used by individuals, organizations or businesses to quickly and easily determine the location where an image was captured. The system relies on the exif metadata that is embedded in most digital images and uses image processing techniques to extract and analyze the metadata.

The system is designed to be user-friendly and accessible, with a simple and intuitive interface that allows users to easily upload their images, extract the location data and view the results. The system is also designed to be scalable and can be used by individuals or organizations of any size, from small businesses to large corporations.

The system is built using a combination of technologies, including Python, Flask, HTML, CSS, and Bootstrap. The system also makes use of the Pillow library for image processing. The system is designed to be easily deployed on any platform, making it accessible to users on a wide range of devices, including desktop computers, laptops, tablets and smartphones.

The system works by first accepting an image from the user. The system then processes the image using image processing techniques to extract the exif metadata, which contains information about the location where the image was captured. Once the metadata is extracted, the system uses a database of location data to match the location information with a physical location on the map. The system then presents the location data to the user in an easy-to-read format, including the address, latitude and longitude, and a map showing the location.

One of the main advantages of the location finding using image exif data system is its accuracy. The system is able to accurately determine the location where an image was captured, which can be useful for a wide range of applications, including travel, business, and law enforcement. The system is also fast and efficient, allowing users to quickly and easily extract location data from their images.

Another advantage of the system is its ease of use. The system is designed to be user-friendly and accessible, with a simple and intuitive interface that allows users to easily upload their images and view the location data. The system is also designed to be scalable and can be used by individuals or organizations of any size.

In conclusion, the location finding using image exif data system is a powerful and innovative tool that can be used by individuals, organizations or businesses to quickly and easily determine the location where an image was captured. The system is accurate, fast, and easy to use, making it an ideal solution for a wide range of applications. The system is also scalable and can be easily deployed on any platform, making it accessible to users on a wide range of devices.

4.1.1 Limitation of Existing System

Some of the limitation are:

1. Inaccurate results: Without the image exif data, location finding relies heavily on text-based inputs like place names, postal codes, and street addresses. These inputs are not always accurate, and the system might return inaccurate results. Moreover, if the user enters a vague or incomplete location

description, the system may not be able to locate the place correctly.

2. Time-consuming: Finding a location using text-based inputs can be time-consuming. Users may have to type in long and complex place names, which can be a tedious task. Additionally, users might have to enter multiple inputs to get to the exact location, which can be a cumbersome process.

3. Language barriers: Text-based inputs are dependent on language. If a user does not know the language of the region they are trying to locate, it can be challenging for them to enter the correct input. For instance, if a person wants to locate a place in Japan but does not know Japanese, they may not be able to enter the correct input.

4. Accessibility issues: Text-based inputs may not be accessible to all users, especially those who have visual or physical impairments. They may not be able to type in the required inputs, making it difficult for them to use the location finding service.

5. Lack of context: Text-based inputs do not provide any context about the location, such as the surroundings, nearby landmarks, or any other visual clues. This information is critical, especially when navigating unfamiliar areas. Without it, users might find it challenging to locate the place accurately.

In summary, the limitations of location finding without the image exif data feature make it challenging for users to find locations accurately and efficiently. Therefore, incorporating image exif data in location finding can significantly improve the accuracy and usability of the system.

4.2 Proposed System

4.2.1 Objectives of the proposed system

The objective of the proposed system in this project is to create a location finding app that uses image EXIF data as input to find the location and route of a place. The proposed system aims to eliminate the need for typing the name of a place and searching for its location and route by using an image as input instead. The system will use the EXIF data of the image to retrieve all the necessary information, including altitude, longitude, latitude, and more, to find the location and route of the place. The proposed system aims to make the process of finding a location or route more convenient and user-friendly by using an image as input.

4.2.2 Users of the Proposed system

The proposed system of a location finding app with image EXIF data as input can be beneficial to a wide range of users, including:

1. Tourists and Travelers: People who are exploring new places and want to find their way around without having to type the name of a place can use this app.

2. Photographers: People who take photos with their cameras or smartphones and want to know the exact location where the photo was taken can use this app.

3. Adventurers: People who love to explore remote and off-the-beaten-track locations can use this app to find their way around and navigate to their desired destination.

4. Researchers: Researchers who need to document the location of their research sites can use this app to record the location of their fieldwork and easily retrieve it later.

5. Emergency responders: Emergency responders who need to quickly locate and navigate to a specific location can use this app to find their way.

Overall, the proposed system can be useful to anyone who needs to find the location or route of a place quickly and conveniently.

5. ASSUMPTION AND DEPENDENCIES

Assumptions and dependencies in a project refer to factors that are not directly under the control of the project team but still need to be considered in order to successfully complete the project. Some possible assumptions and dependencies for this project could include:

Assumptions:

- Users will have access to a smartphone or other device with a camera and GPS functionality.
- Users will be able to capture images with sufficient quality and resolution to extract the necessary EXIF data.
- Users will have an internet connection in order to use the app and access location information.
- The exif data will be accurate and reliable.

Dependencies:

- The accuracy of the location data will depend on the quality and coverage of the GPS and mapping technology used.
- The app's functionality may depend on third-party APIs or services, which may have their own limitations or dependencies.
- The app's performance may depend on the user's device and network connection, which may be outside the project team's control.
- The app's development and release may be subject to regulatory requirements or approval processes.

6. TECNOLOGIES

6.1 Tools used in Development

Based on the project requirements and the selected software development process model, various tools may be used in the development of this project. Here are some commonly used tools:

1. Integrated Development Environment (IDE): An IDE is a software application that provides a comprehensive environment for developers to write, test, and debug their code. Here we used VS Code's IDE for Python.

2. Image Processing Libraries: Since the project involves processing images and extracting their exif data, image processing libraries such as Pillow is used here.

3. Web Framework: A web framework named as Flask is used to build the web application, define routes, handle user requests, and perform server-side logic.

4. Front-end Technologies: HTML, CSS, and Bootstrap is used to create a responsive and visually appealing user interface.

5. Deployment Tool: Microsoft MAP API has been used as a deployment tool.

6.2 Development Environment

The development environment for the location finding project using image EXIF data was set up using PW Skills Lab and Visual Studio

Code (VS Code). PW Skills Lab is an online platform that provides a virtual machine with pre-installed software for web development, including Python, Flask, and Pillow. VS Code is a lightweight code editor that supports multiple programming languages and provides various features to enhance productivity.

To start with, PW Skills Lab was accessed through a web browser. The virtual machine was created and configured with the necessary settings and specifications. The pre-installed software on the virtual machine was then updated to the latest versions. Once the update was complete, the required Python packages were installed using the pip package manager. The packages included Flask, Pillow, and other dependencies needed for the project.

Next, VS Code was downloaded and installed on the local computer. The VS Code Remote Development extension was added to the editor, which enabled the connection to the PW Skills Lab virtual machine. The extension allowed the developer to open and edit files on the virtual machine through VS Code on their local computer.

Once the connection was established, the project files were transferred from the local computer to the virtual machine. The files were stored in a project directory created on the virtual machine. The directory was initialized as a Flask application, and the necessary configuration files were created.

The project development was carried out using Python, HTML, CSS, and Bootstrap. Python was used for the server-side logic, while HTML and CSS were used for the frontend web page design. Bootstrap was

used as the CSS framework to enhance the UI design and ensure responsiveness across different screen sizes.

Pillow was used to extract the exif data from the image input and obtain the location information. Flask was used as the web framework for the application, providing the required routing and handling of requests and responses. Flask's redirect functionality was used to redirect the user to the appropriate web page after processing the input image.

The development environment was tested by running the application on the virtual machine and accessing it through a web browser on the local computer. The application was tested for different use cases and scenarios to ensure its robustness and reliability.

In conclusion, the development environment for the location finding project using image exif data was set up using PW Skills Lab and VS Code. The virtual machine provided by PW Skills Lab was used to install the necessary software and packages required for the project. VS Code was used as the code editor, and the Remote Development extension enabled the connection to the virtual machine. Python, Flask, HTML, CSS, Bootstrap, and Pillow were used to develop the application. The application was tested to ensure its functionality and reliability.

6.3 Software Interface

The software interface for the location finding system using image exif data is designed to be user-friendly and intuitive. It consists of a web-based user interface that allows users to upload an image and receive the location and route information of the place depicted in the image.

The home page of the interface contains a simple form with a button to upload the image. Upon uploading, the image is processed and analyzed for its EXIF data. The user is then redirected to a new page that displays the location and route information of the place depicted in the image. The page also contains a Google Map that displays the location and the route, making it easy for the user to visualize and understand the information.

The interface is designed to be responsive and adaptable to different screen sizes, making it accessible and easy to use on various devices, including desktops, laptops, tablets, and smartphones.

The interface also includes error handling mechanisms to ensure that the user is informed of any issues and provided with suggestions for resolving them. For example, if the uploaded image does not contain any EXIF data, the user is informed of the issue and provided with a suggestion to try again with a different image.

Overall, the software interface for the location finding system using image EXIF data is designed to be user-friendly, intuitive, and efficient, enabling users to quickly and easily find the location and route information of a place depicted in an image.

6.4 Hardware Used

The hardware used in the development and deployment of a software application can significantly affect its performance and reliability. In the case of the location finding app using image EXIF data, the hardware requirements are moderate, and the application can run on a variety of devices.

For development purposes, any modern computer or laptop with at least 8 GB of RAM, a multi-core processor, and a dedicated graphics card can be used. The development environment requires software like VS Code, Flask, Python, and Pillow. These software tools can run on Windows, macOS, or Linux operating systems. A solid-state drive (SSD) is recommended for faster file access and improved performance.

When it comes to deploying the application, a server or cloud-based service is needed to handle user requests and process data. The server can be hosted on any computer or virtual machine running a Linux operating system. The recommended server configuration includes at least 4 GB of RAM, a multi-core processor, and a reliable internet connection.

If the application is expected to handle a large number of user requests, a load balancer can be used to distribute the traffic across multiple servers. Additionally, a database server can be used to store the application data, such as user profiles and location information.

To ensure high availability and fault tolerance, it is recommended to use redundant hardware components, such as power supplies, storage drives, and network adapters. Additionally, regular backups of the application data should be performed to prevent data loss in case of hardware failure or other disasters.

In summary, the hardware requirements for the location finding app using image EXIF data are moderate and can be met by most modern computers and servers. The recommended configuration includes at least 8 GB of RAM, a multi-core processor, and a dedicated graphics

card for development purposes. For deployment, a server or cloud-based service with at least 4 GB of RAM and a reliable internet connection is needed. Redundant hardware components, load balancers, and database servers can be used to improve the performance, availability, and reliability of the application.

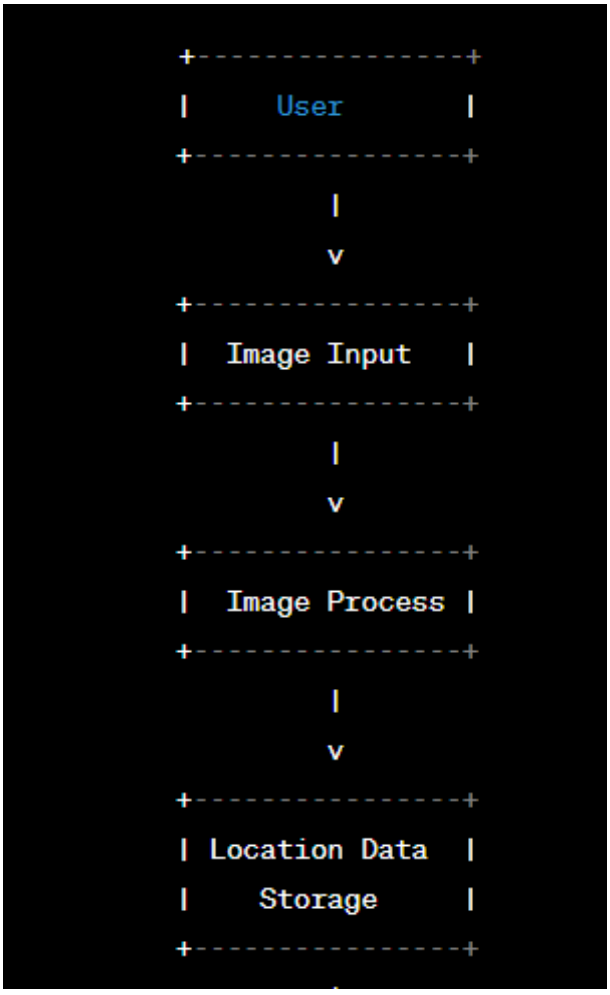
7. DESIGN

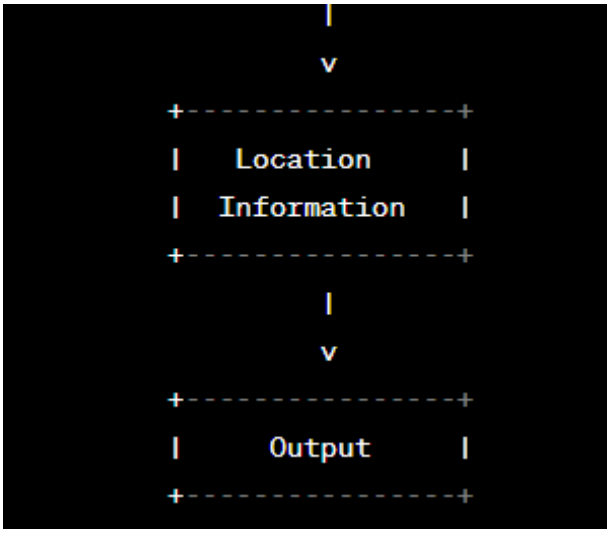
7.1 Data Flow Diagram

As described earlier, the proposed system is an image-based location finding app that uses EXIF data to extract location-related information from images and provide location and route information to the user.

Below is the data flow diagram:

Here is a possible data flow diagram for the project with the requested components:





The diagram shows the flow of data between the different components of the system. The user provides an image as input, which is processed to extract location information. The extracted location information is stored in a location data storage system, which can be queried later. The output component generates a response to the user based on the extracted location information.

The Image Input component receives an image file from the user and sends it to the Image Process component. The Image Process component extracts the location information from the image exif file and sends it to both the Location Data Storage component and the Location Information component.

The Location Data Storage component stores the location information in a database for later retrieval. The Location Information component receives the location information from the Image Process component and provides it to the Output component. The Output component generates a response to the user based on the location information.

Overall, this data flow diagram provides a high-level view of how the different components of the system interact with each other to provide location information based on image data.

7.2 Entity Relationship Diagram

As this project is about creating a location finding website with image EXIF data, an entity relationship diagram (ERD) can be designed to represent the different entities and their relationships in the system. Here is an example of an ERD for this project:

Fig. 7.2 Entity Relationship diagram

In this ERD, there are three main entities: Image, Location, and User. An Image entity represents the image uploaded by the user, which contains the EXIF data. A Location entity represents a particular location that can be searched for using the app. A User entity represents a user of the app.

There are three relationships shown in the ERD: Contains, Maps To, and Searches For. The Contains relationship connects an Image entity with one or more Location entities that are present in the image. The Maps To relationship connects a Location entity with one or more Image entities that contain information about that location. The Searches For relationship connects a User entity with one or more Location entities that the user is searching for.

Finally, there are three additional entities: Extracts, Defines, and Performs. The Extracts entity represents the process of extracting EXIF data from an uploaded image. The Defines entity represents the process of defining a new Location entity based on the extracted EXIF data. The Performs entity represents the process of performing a search for a Location entity based on user input.

8. DATA DICTIONARY

A data dictionary is a central source of information about the data that is used or stored in a system. It contains the definitions of all the data elements, their characteristics, and the relationships between them. In the context of this project on location finding using image EXIF data, the data dictionary includes the following:

1. Image EXIF data: The metadata embedded within the image file that contains information about the camera settings and location of the photograph.

2. Image processing module: Pillow library is used to extracts the image EXIF data from the image file and processes it to extract the location information. A method defined as “Data( )” is used to fetch the details from the image EXIF data, which further checks for the coordinates of latitude and longitude by “image_coordinates()” and “decimal_coords()” methods.

3. Location database: A database that contains the location information for each photograph in the system. The database includes the latitude and longitude coordinates, as well as any additional information about the location.

4. User interface: The interface through which the user interacts with the system to input image files and receive location information. “features()” method is responsible for handling user interface.

5. Output: The location information that is returned to the user after the image processing is completed. “Map()” methods helps in presenting the location of the requested image.

6. Error messages: If the image EXIF data doesn't contains the coordinates then a message is generated as "No Coordinates".
If no EXIF data is linked to the requested image then "The image has no Exif info" gets printed which informs the user about the absence of EXIF data in the image

7. System settings: Various libraries were install for the smooth running of the application like flask, pil, exif and piexif .

9. TESTING

9.1 Unit Testing

Unit testing is an important part of software development which ensures that each unit or component of the system is functioning as expected. In the case of the location finding project, unit testing can be performed on various features of the application. Here are some examples of unit testing for the feedback and features pages:

Feedback Page:

- A unit test can be performed to ensure that clicking the "send review" button opens the feedback page.

- Another unit test can be performed to ensure that the form is linked to the "send review" button.

- A unit test can be performed to ensure that clicking the "submit" button on the feedback page submits the review successfully.

- A unit test can be performed to ensure that the message "Message sent successfully" is displayed after successful submission of the review.

Features Page:

- A unit test can be performed to ensure that if the user does not upload any image and clicks on the upload button, the message "No image uploaded! Try Again……" is displayed.

- Another unit test can be performed to ensure that if any technical issue occurs, the message "Please upload image" is displayed.

- A unit test can be performed to ensure that if the image does not have any EXIF data, the message "The Image has no EXIF information" is displayed.

- A unit test can be performed to ensure that if the image has EXIF data but no coordinates, the message "No Coordinates" is displayed.

Unit testing helps in identifying issues early in the development process, saving time and resources in the long run.

9.2 Integrity Testing

Integrity testing for this project will focus on ensuring that the system behaves in a consistent and reliable manner, and that data is accurately processed and stored. The following scenarios can be tested to ensure the integrity of the system:

1. Feedback Page:

- Test that the "send review" button is linked to the feedback form and that the form is submitted successfully.

- Test that the message page displays the confirmation message "Message sent successfully" after the review has been submitted.

- Test that the feedback form cannot be submitted if any of the required fields are left empty.

- Test that the feedback form cannot be submitted if the user enters invalid data in any of the fields.

2. Features Page:

- Test that the upload section correctly handles different file formats and sizes.

- Test that the system returns an error message if the user attempts to upload a file that is too large.

- Test that the system returns an error message if the user attempts to upload a file that is not an image.

- Test that the system returns an error message if the user attempts to upload an image that does not contain EXIF data.

- Test that the system returns an error message if the image contains EXIF data but no location coordinates are present.

- Test that the system correctly processes and displays location data when it is available in the image EXIF data.

3. Image Processing:

- Test that the image processing algorithms accurately extract the relevant data from the image EXIF data.

- Test that the system correctly handles situations where the image EXIF data is corrupted or incomplete.

- Test that the system correctly handles situations where the image file is not readable or cannot be opened.

4. Overall System:

- Test that the system correctly handles concurrent user requests and does not produce unexpected results.

- Test that the system is able to handle large volumes of data without crashing or producing errors.

- Test that the system is able to recover from unexpected errors or crashes without losing data or corrupting the database.

By testing these scenarios, we can ensure that the system behaves in a consistent and reliable manner, and that data is accurately processed and stored, which in turn ensures the integrity of the system.

10. SNAPSHOTS

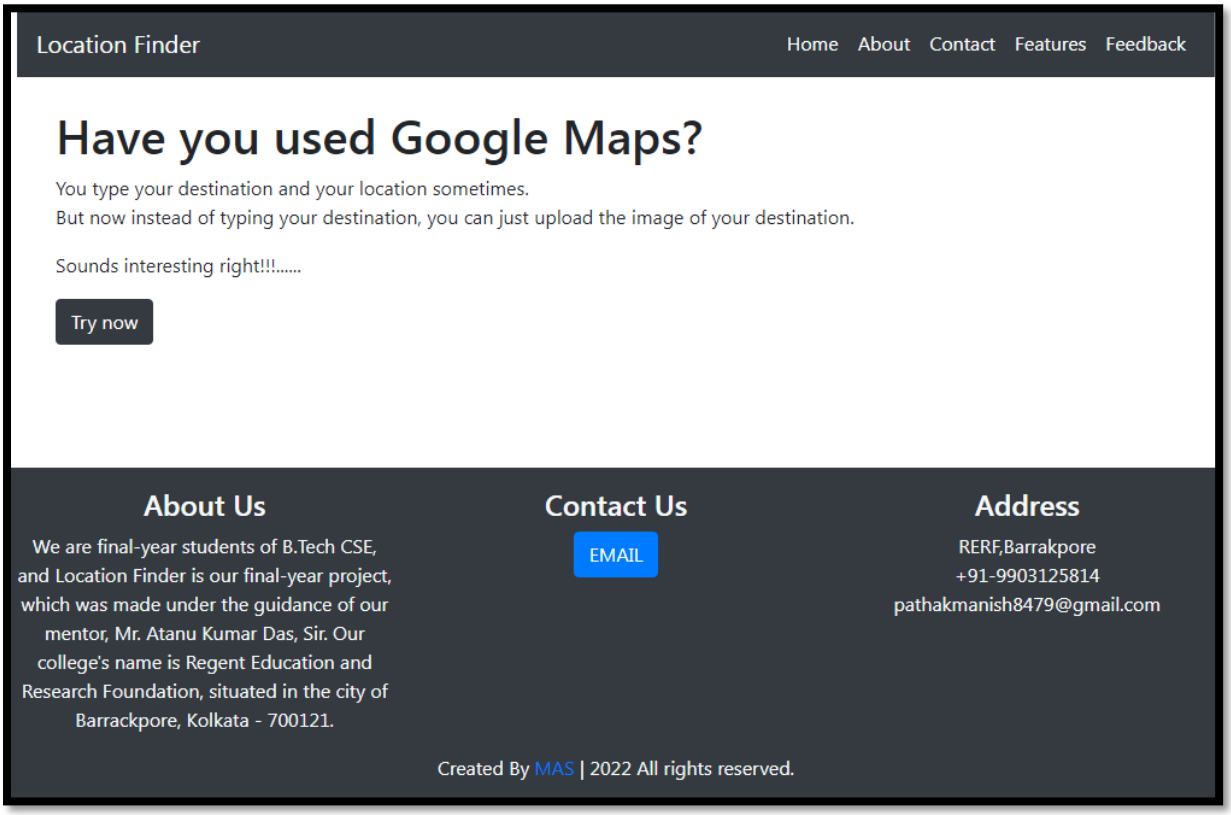


Fig. 10.1 Home Page

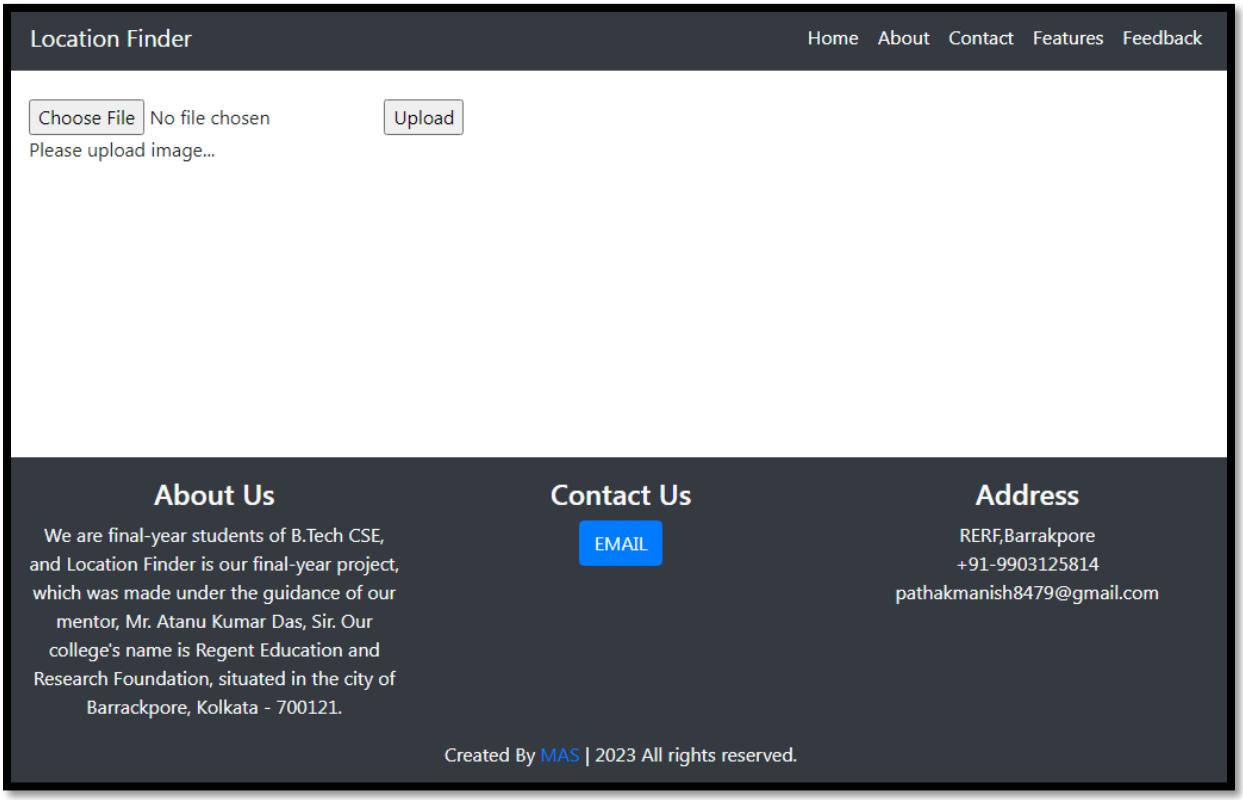


Fig. 10.2 Features Page

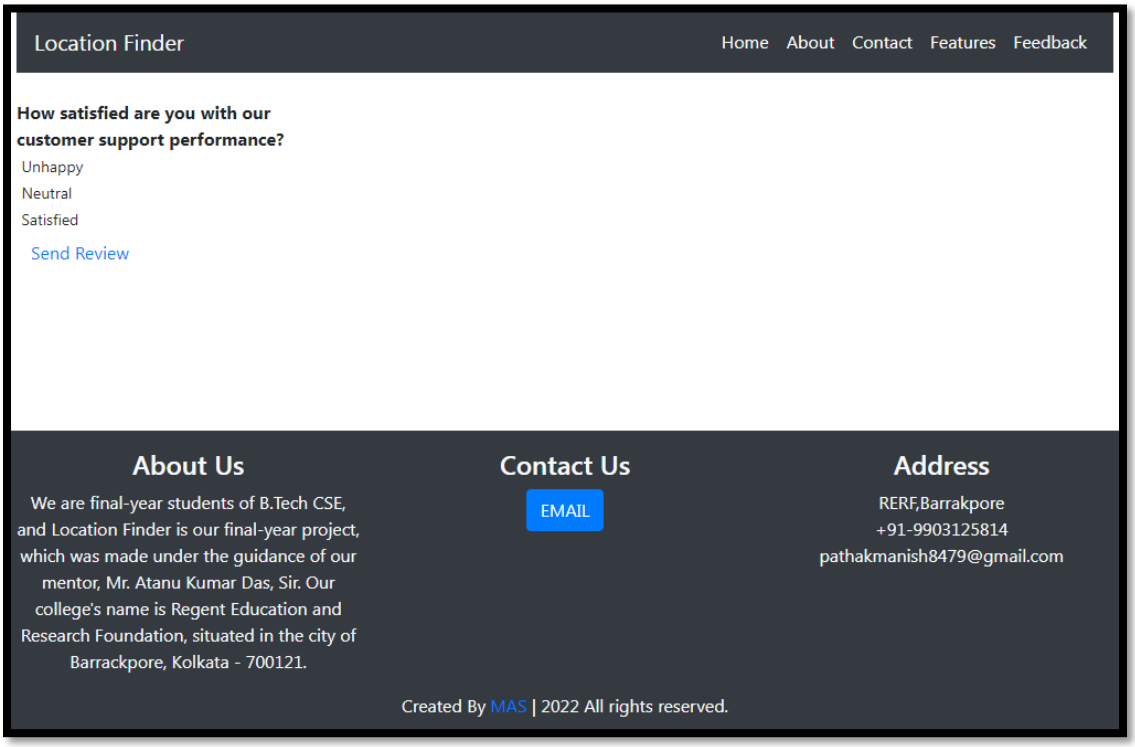


Fig. 10.3 Feedback Page

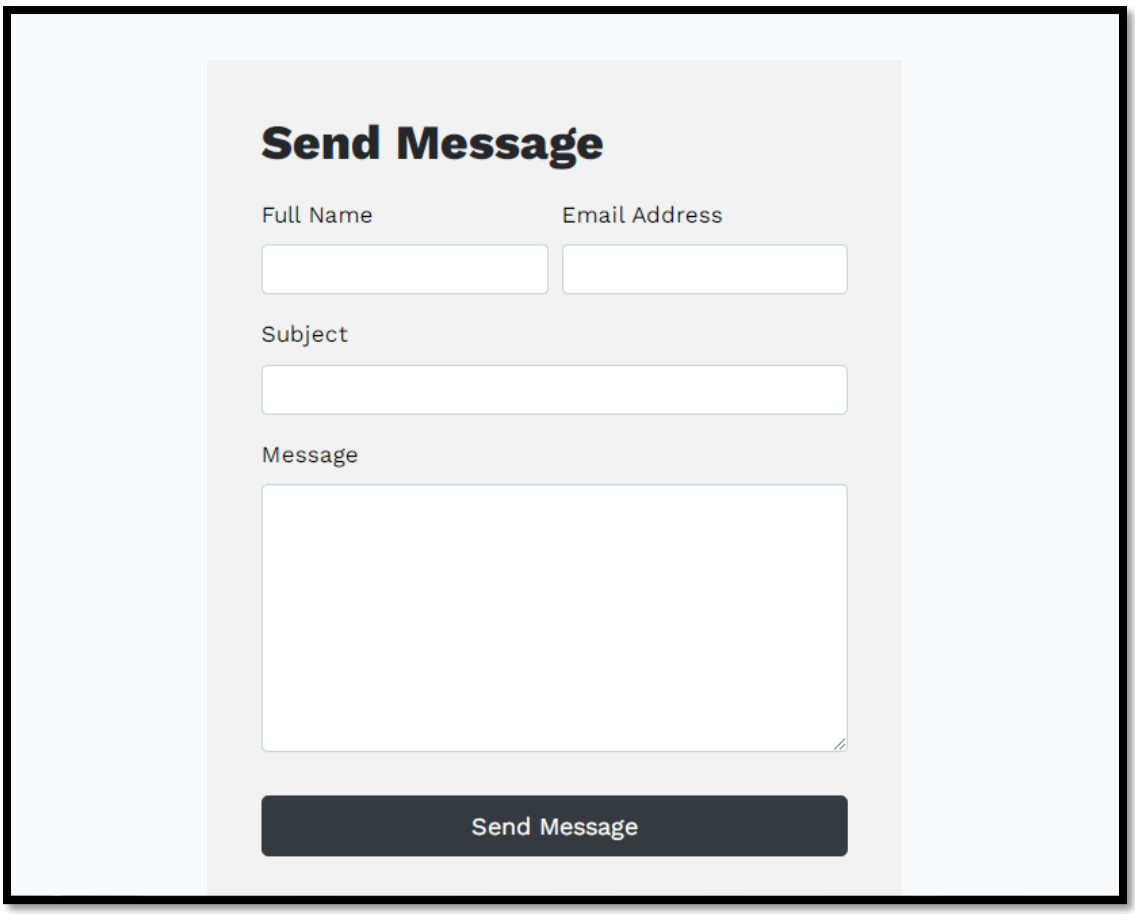


Fig. 10.4 Review Form

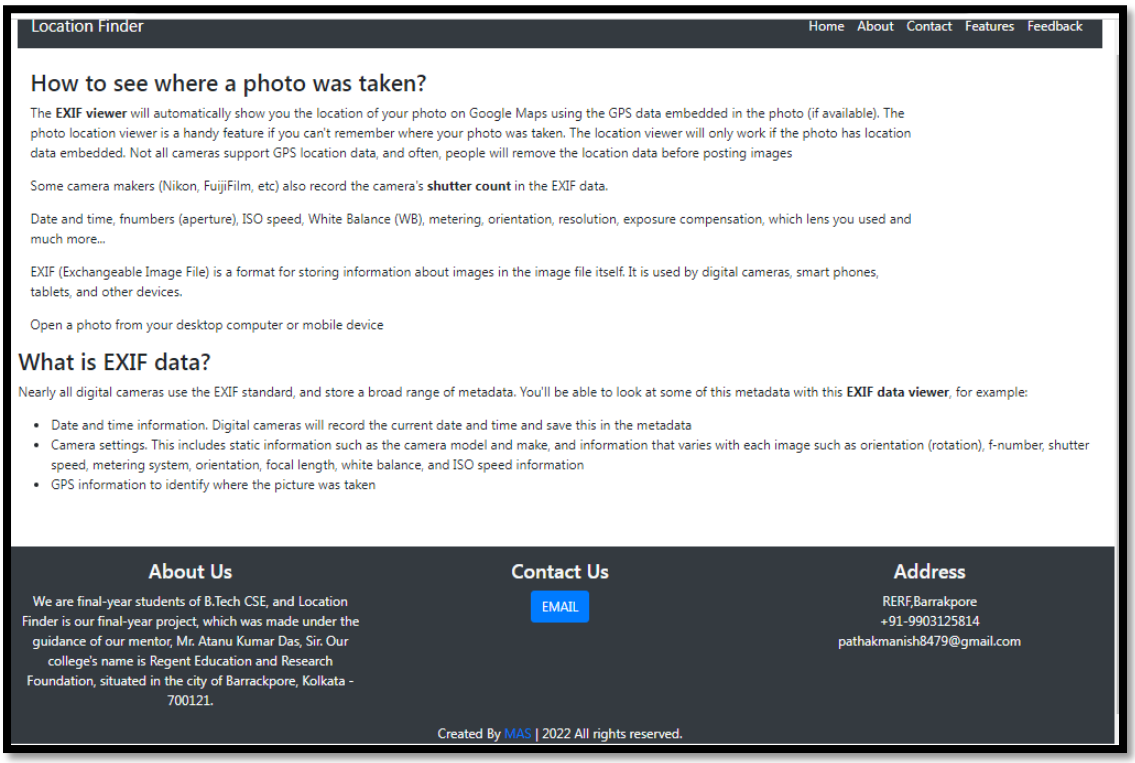


Fig. 10.5 About Page

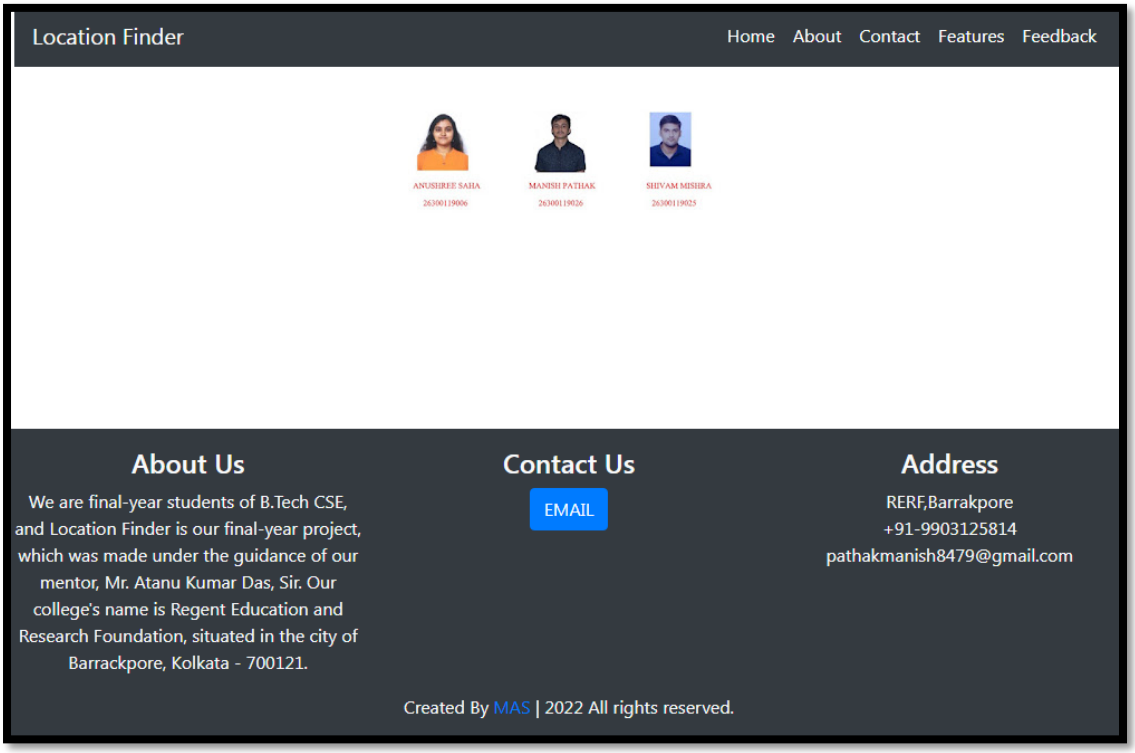


Fig 10.6 Contact Page

Fig. 10.7 Image used as an example

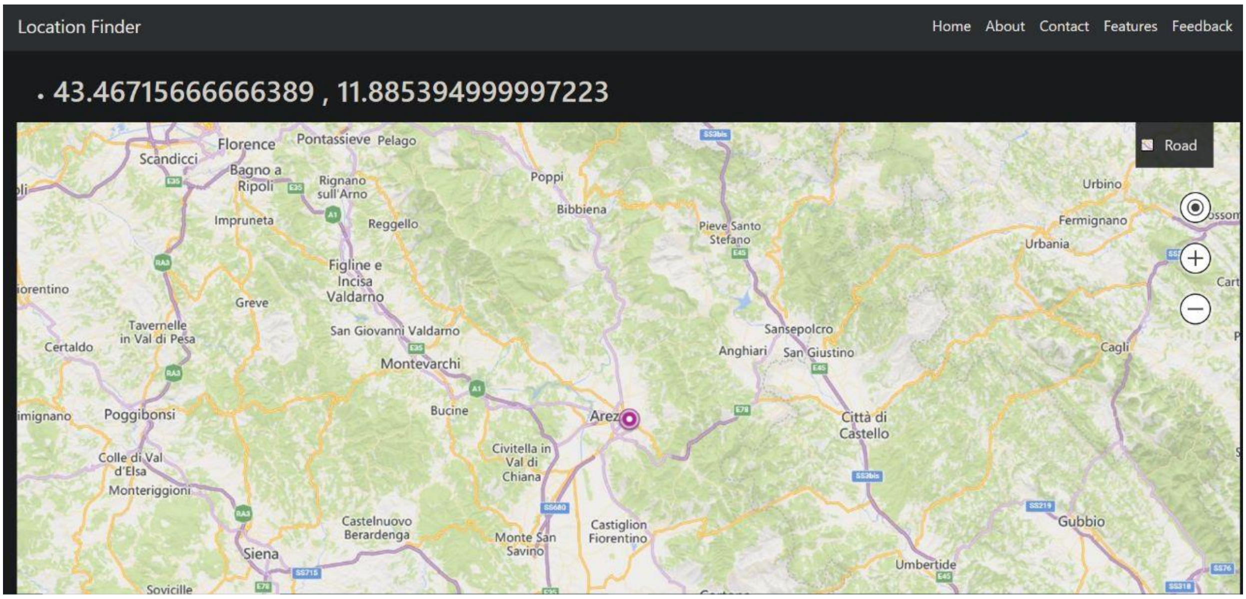


Fig. 10.8 Map generated

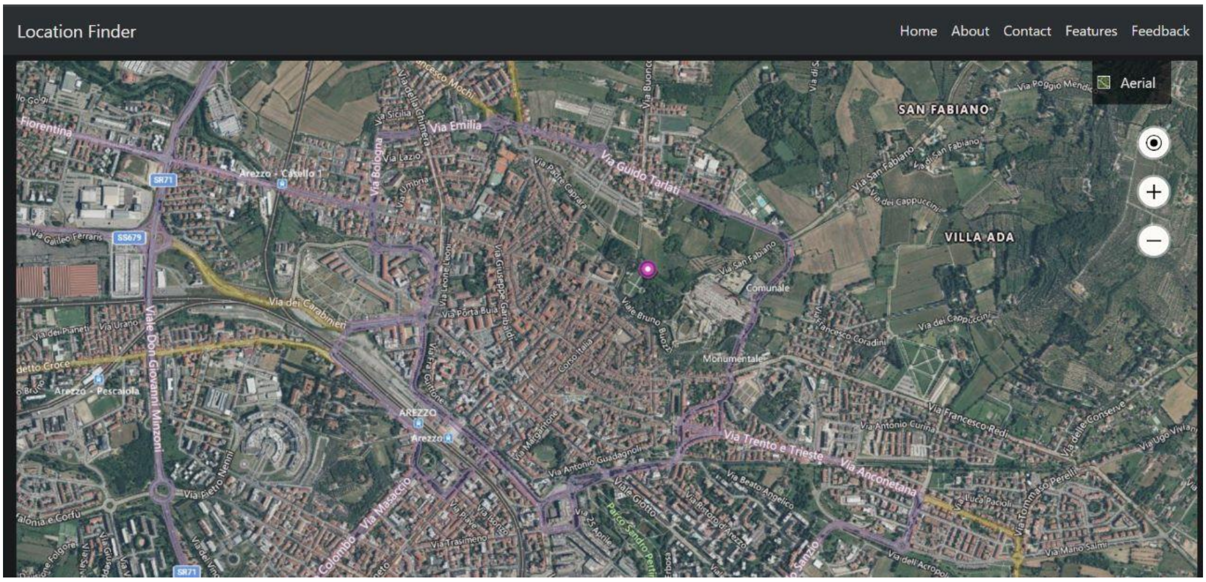


Fig. 10.9 Map generated

Fig. 10.10 Map generated

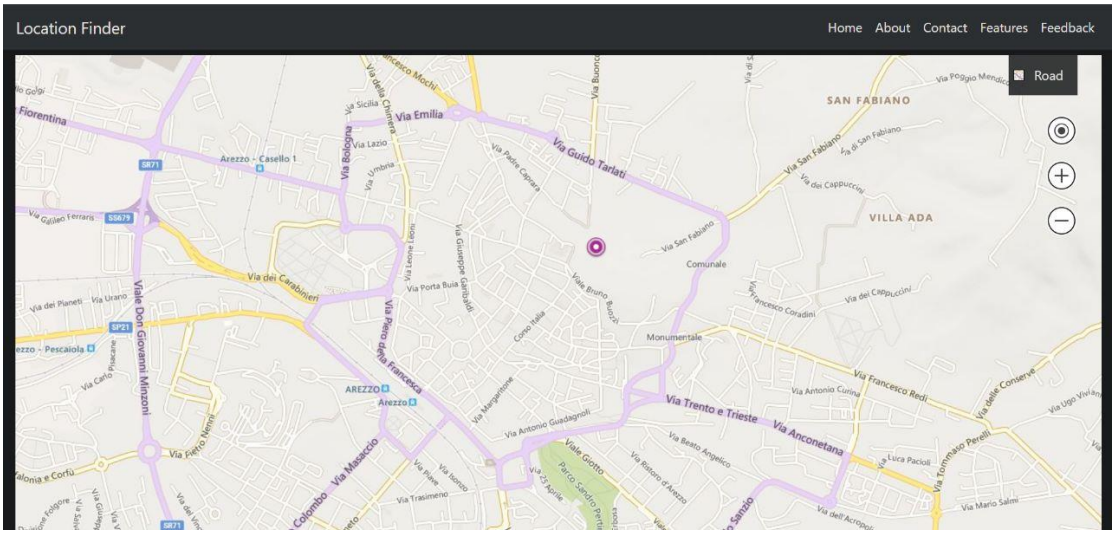


Fig. 10.11 Map generated

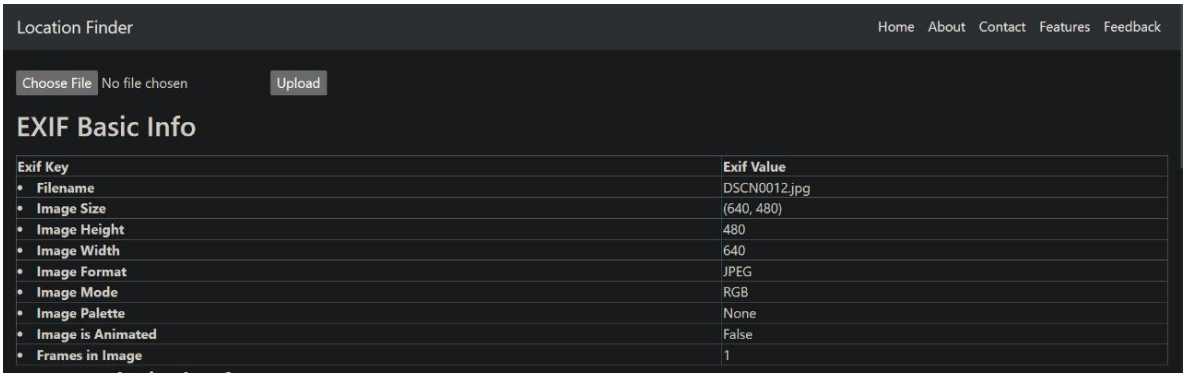


Fig. 10.12 EXIF Basic Information of the given image

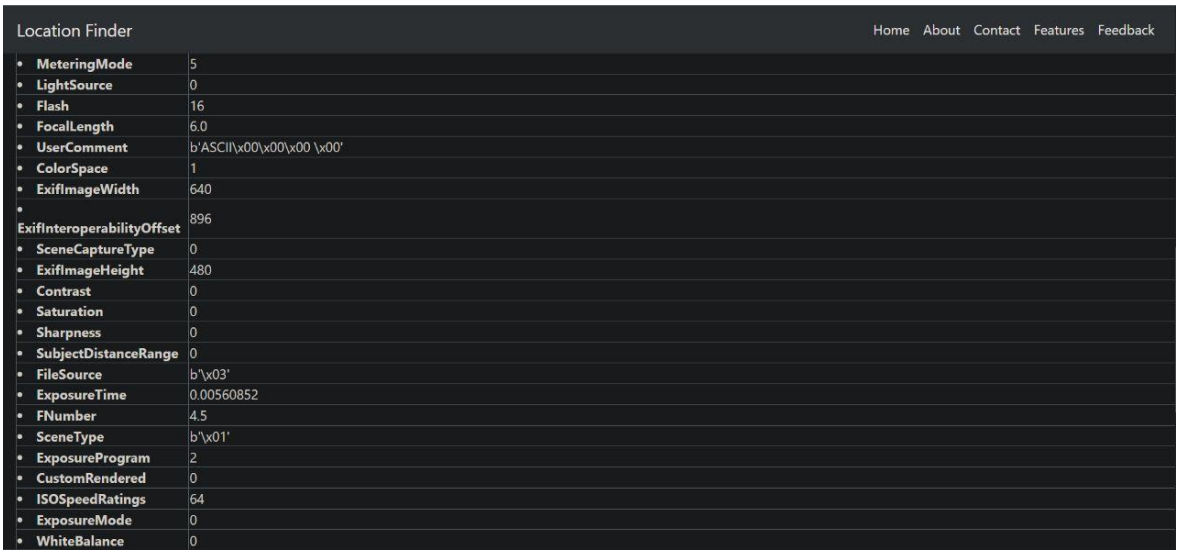


Fig. 10.13 EXIF Basic Information of the given image

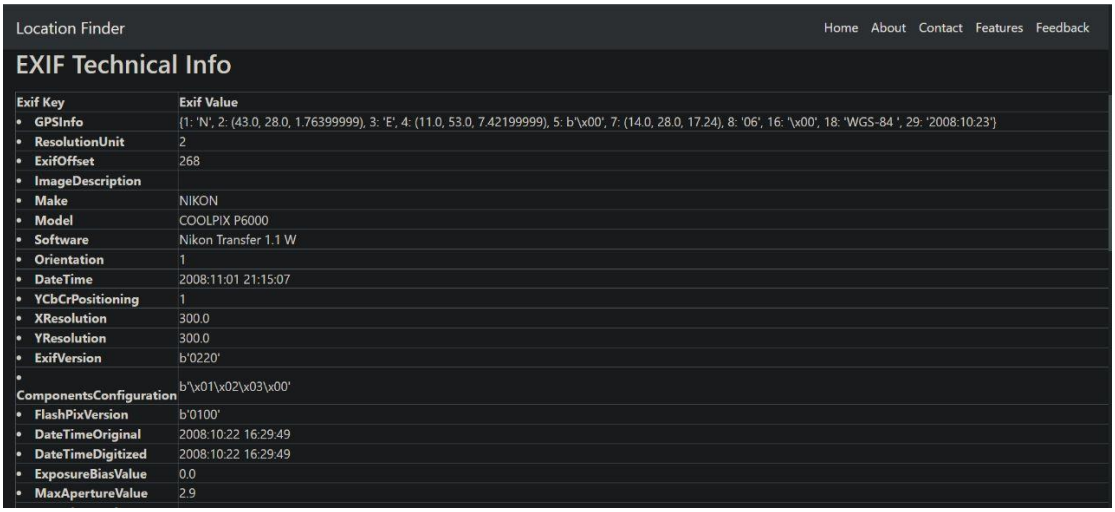


Fig. 10.14 EXIF Technical Information of the given image

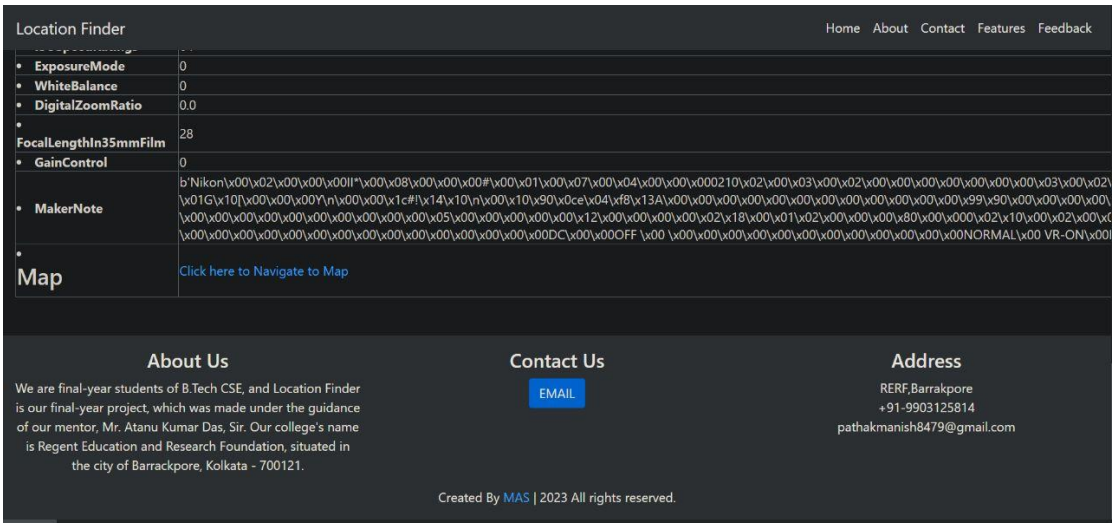


Fig. 10.15 EXIF Technical Information of the given image

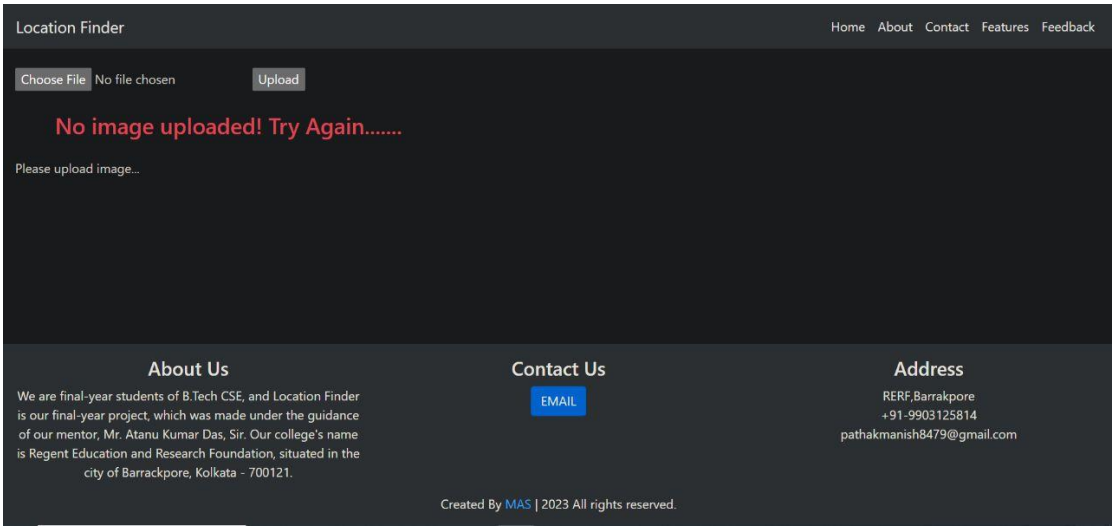


Fig. 10.16 When user doesn't upload any image but still try to click upload buttion then "No image uploaded1Try Again……" message appears.

11. CONCLUSION and FUTURE SCOPE

Conclusion:

In conclusion, the proposed project aims to create a location-finding app that utilizes image input with EXIF data to provide location and route information. The project is technically, operationally, and economically feasible, and its objective is to provide a user-friendly and efficient alternative to the traditional text-based input location apps. Through the project, we were able to address the limitations of the existing system and come up with an innovative solution to provide better user experience.

Future Scope:

The proposed system has a lot of potential for future improvement and expansion. Some of the possible future scopes are as follows:

1. Integration with social media platforms: Users can share their location and route information with their social media connections, thereby expanding the reach of the app.

2. Voice command input: Adding a voice command input feature can improve the accessibility and ease of use of the app.

3. Integration with smart glasses: Integration with smart glasses can provide a hands-free and immersive experience to the users, enabling them to navigate seamlessly.

4. Real-time traffic updates: Integration with real-time traffic updates can help users to find the fastest and most efficient route to their destination.

5. Augmented Reality (AR) feature: AR can be used to enhance the user experience by providing a real-time view of the user's location and destination.

In conclusion, the proposed system has a lot of potential for future improvements and expansion, and we believe that it can be a valuable addition to the existing location-finding apps in the market.

12. REFERENCES

Here are some references related to location finding using image EXIF data:

1. https://en.wikipedia.org/wiki/Exif
2. https://en.wikipedia.org/wiki/Geotagged_photograph
3. https://en.wikipedia.org/wiki/Real-time_locating_system
4. https://www.techbout.com/find-location-where-photo-was-taken-17094/
5. https://betterprogramming.pub/visualising-photo-geolocation-data-using-python-73ac47059112
6. https://medium.com/spatial-data-science/how-to-extract-gps-coordinates-from-images-in-python-e66e542af354