

Project ID:

24-25J-256

1. Topic (12 words max)

Hiking Assistance System Development

2. Research group the project belongs to

Software Systems & Technologies (SST)

3. Research area the project belongs to

Machine Learning (ML)

4. If a continuation of a previous project:

Project ID	
Year	

5. Brief description of the research problem including references (200 – 500 words max) – references not included in word count.

In Sri Lanka, mountain climbing and hiking are increasingly popular activities, attracting both local and international tourists. However, there is a significant problem in the current hiking experience, hikers lack a reliable system to identify the mountains they encounter, including crucial details such as the mountain's name, height, and exact location. These problems limit the educational and safety aspects of hiking, as well as the overall enjoyment and engagement of hikers who wish to learn more about the terrain they explore.

Despite the stunning landscapes and rich biodiversity, hikers often face challenges in identifying peaks and understanding their geographical context. This lack of information can lead to navigational difficulties, missed opportunities for learning about local geology, flora, and fauna, and potential safety risks in unknown areas. The absence of a centralized, user-friendly platform that integrates image recognition, geolocation services, and detailed data retrieval hinders the ability to enhance the hiking experience comprehensively.

Moreover, the existing hiking apps and resources in Sri Lanka are often outdated, lacking in advanced data features, or do not provide real-time information that could significantly benefit hikers. This situation underscores the need for a novel approach that can bridge this information gap, thereby fostering a more informed, enjoyable, and safer hiking environment.

Thus, the primary research problem is to develop a system that effectively addresses the need for real-time mountain identification and information access. This system should leverage cutting-edge technologies to recognize mountain features through images, provide precise geolocation data, and retrieve comprehensive details about each mountain, including its height, geological background, historical significance, and surrounding environment. Addressing this problem could greatly enhance the hiking experience, promote conservation awareness, and improve safety standards for hikers in Sri Lanka.

References

- [1] Antonio La Salandra, Piero Fraternali, Darian Frajberg (2018) A Location-Based Virtual Reality Application for Mountain Peak Detection
- [2] Roman Fedorov, Davide Martinenghi, Marco Tagliasacchi, Andrea Castelletti (2013) Exploiting User Generated Content for Mountain Peak Detection
- [3] Balázs Nagy (2020) A New Method of Improving the Azimuth in Mountainous Terrain by Skyline Matching

6. Brief description of the nature of the solution including a conceptual diagram (250 words max)

The solution is to create a mobile app to make hiking in Sri Lanka easier, safer, and more fun. This app will help hikers identify mountains, estimate hiking time, show interactive maps, and report trail dangers.

Mountain Identification:

Hikers can point their phone's camera at a mountain, and the app will tell them the name, height, and distance of the mountain. This feature will help hikers learn more about the mountains they see, making the hike more interesting and educational.

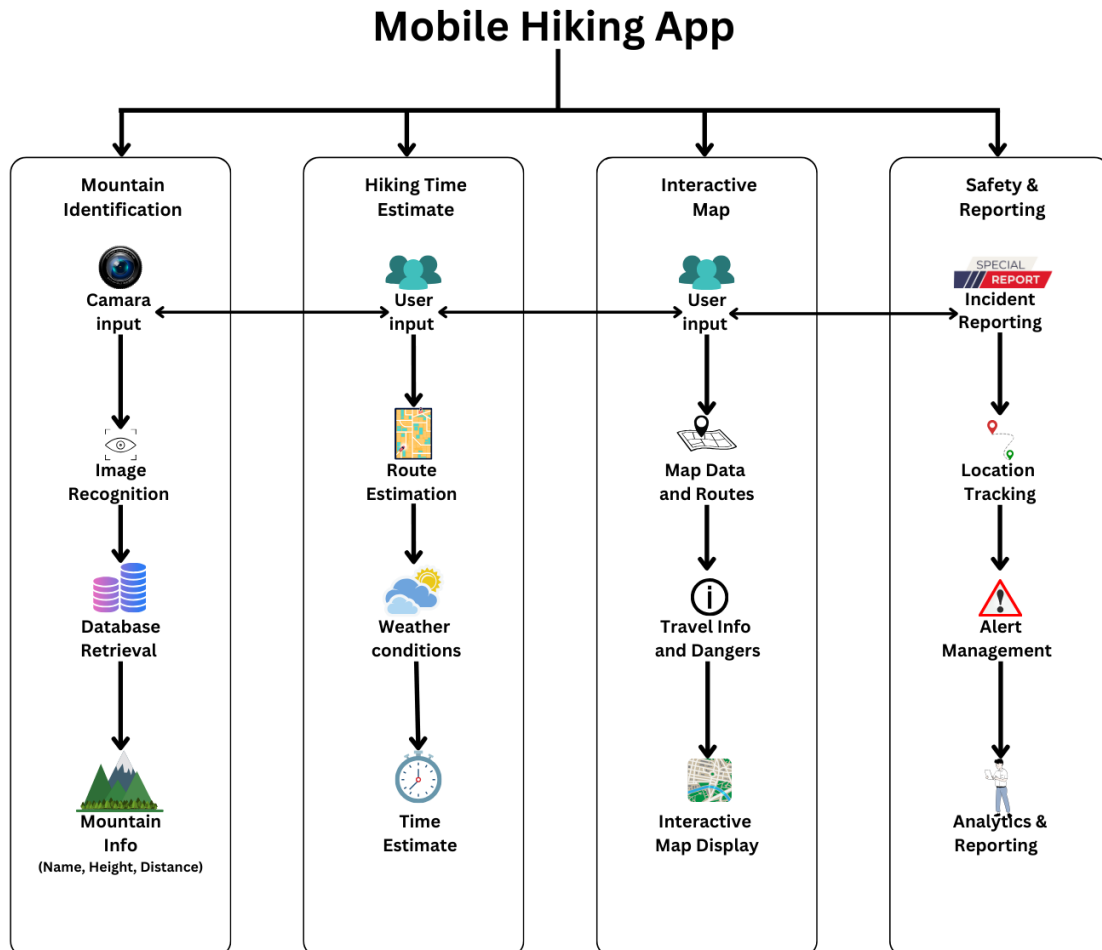
Hiking Time Estimation:

The app will help hikers plan their trips by estimating how long it will take to hike to a mountain from their current location. It will consider things like the weather and trail conditions to give a good estimate of the hiking time.

Interactive Map:

The app will have a map that shows mountains, trails, and interesting spots. Hikers can draw their routes on the map, save them, and share them with friends. They can also see routes shared by other hikers. This will help hikers find new trails and make the hiking experience more enjoyable.

By combining these features, the app will be a valuable tool for hikers in Sri Lanka. It will provide important information, help with trip planning, and improve safety, making hiking a more enjoyable and educational activity.



7. Brief description of specialized domain expertise, knowledge, and data requirements

(300 words max)

Developing the hiking app requires expertise in several specialized areas. First, knowledge of geography and mapping is essential for understanding geographical features and working with geographic information systems (GIS). This necessitates access to detailed topographic maps, elevation data, and trail maps from local geographic surveys and international mapping services. Second, proficiency in photography and image recognition is crucial to accurately identify mountains from photos, requiring a comprehensive set of annotated mountain images from public repositories, satellite imagery, and crowdsourced photos. Third, insight into hiking and trail information is needed to understand common routes, trail conditions, and typical hazards, which involves collecting GPS tracks, waypoints, and user reviews from local hiking groups and tourism organizations. Fourth, skills in user experience and interface design are vital for creating an intuitive app interface, especially for augmented reality (AR) features, relying on user feedback and usability testing data. Fifth, knowledge of safety and emergency services is important to address hiking risks and emergency response procedures, requiring reports on past incidents, safety guidelines, and real-time trail condition data from local safety authorities. Lastly, understanding weather and environmental conditions is necessary to account for weather impacts on hiking safety, necessitating access to weather forecasts, historical data, and environmental monitoring reports from meteorological services and environmental agencies. Integrating these areas of expertise and data will enable the app to provide accurate, useful, and timely information, enhancing the hiking experience and ensuring the safety of hikers exploring Sri Lanka's mountains.

8.Objectives and Novelty

Main Objective Develop a Hiking Assistance System (A Comprehensive Study on Developing a Mountain Recognition Application Using Image Recognition, Geolocation, and Data Retrieval Techniques). This mountain recognition application designed to enhance the hiking experience in Sri Lanka by leveraging image recognition, geolocation, and data retrieval technologies. This will be implemented as a mobile application that hikers can use to identify mountains in real-time and access comprehensive information about them.			
Member Name	Sub Objective	Tasks	Novelty
De Silva M.S.D.S.	Mountain Identification	<ul style="list-style-type: none"> Developing computer vision algorithms that works well in mountain landscapes. Build a strong Augmented Reality (AR) system to show real-time information. Use user feedback to continuously improve recognition accuracy. 	Use computer vision and location data to correctly identify mountains. Add Augmented Reality (AR) to show mountain information on the camera view in real time.

De Silva G.S.D.	Geospatial Data Analysis for Distance and Travel Time Estimation	<ul style="list-style-type: none"> Machine learning models for predicting and adjusting travel times based on real-time inputs. Algorithms to calculate optimal routes and provide alternative paths. Integration of environmental data to increase forecast accuracy. 	<p>Build predictive models that incorporate real-time data such as weather conditions, road conditions, and user energy levels.</p> <p>Use machine learning to improve accuracy of travel time estimates based on historical data and user feedback.</p>
Ranathunga R.A.G.D.	Interactive Map for Hikers.	<ul style="list-style-type: none"> Create a detailed map that hikers can use, with various layers of information like trails, mountains, and points of interest. Allow hikers to share their routes with others and work together to map out new trails. Use data analysis to gather useful information from the routes and 	<p>The map will update in real-time with new information from hikers and official sources. Hikers can save their favorite routes and share them with others, including details like interesting spots and important waypoints.</p>

		experiences shared by hikers.	
Rashmitha K.M.	Safety Reporting	<ul style="list-style-type: none"> • Crowdsourcing mechanisms to encourage user participation and data contribution. • Machine learning algorithms for validating and integrating user reports. • Notification systems to alert hikers about potential hazards and changing trails 	Implement crowdsourcing and machine learning for real-time hazard reporting, verification, and notifications, along with offline emergency communication capabilities and health monitoring integration.

9. Supervisor checklist

- a) Does the chosen research topic possess a comprehensive scope suitable for a final-year project?

Yes		No	
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- b) Does the proposed topic exhibit novelty?

Yes		No	
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- c) Do you believe they have the capability to successfully execute the proposed project?

Yes		No	
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- d) Do the proposed sub-objectives reflect the students' areas of specialization?

Yes		No	
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- e) Supervisor's Evaluation and Recommendation for the Research topic:

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10. Supervisor details

	Title	First Name	Last Name	Signature
Supervisor				
Co-Supervisor				
External Supervisor				
Summary of external supervisor's (if any) experience and expertise				

This part is to be filled by the Topic Screening Panel members.

Acceptable: Mark/Select as necessary

Topic Assessment Accepted	
Topic Assessment Accepted with minor changes (should be followed up by the supervisor)*	
Topic Assessment to be Resubmitted with major changes*	
Topic Assessment Rejected. Topic must be changed	

* Detailed comments given below

Comments

The Review Panel Details

Member's Name	Signature

***Important:**

1. According to the comments given by the panel, make the necessary modifications and get the approval by the **Supervisor** or the **Same Panel**.
2. If the project topic is rejected, identify a new topic, and follow the same procedure until the topic is approved by the assessment panel.