Trek – Tourism and Travel Destinations Promoting System with AR based Rewards and Health Monitoring Device

Hulangamuwa R.R.W.G.B.P.P.M.¹, Fernando A.R.V.S¹, Weesinghe W.M.P.D¹, Suriyaa Kumari¹, Wijewardena K.J.S.¹, and Dulani Jayasinghe¹

¹Sri Lanka Institute of Information Technology Department of Information Technology

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Abstract

The tourism industry has been severely impacted by a series of challenges in recent years, including the COVID-19 pandemic, the Russia-Ukraine War, and supply chain disruptions. These adversities have led to economic downturns and high inflation rates, making it difficult for the industry to recover and thrive. The existing situation is characterized by decreased travel demand, reduced revenue for tourism businesses, and limited opportunities for travelers to explore new destinations. One of the major problems faced by the current problem domain is the need to revitalize the tourism industry and stimulate travel activity. Traditional approaches to revive the industry have proved insufficient, and financial constraints have made it difficult for individuals to afford travel expenses. To address these problems, a comprehensive mobile application is proposed, integrating the move-to-earn concept. This concept incentivizes travelers to engage in physical activities while exploring destinations, earning rewards like digital tokens or discounts on travel-related services based on their activity level. By encouraging physical activity and exploration, the app revitalizes the tourism industry, boosting footfall and generating revenue for local businesses. Additionally, the rewards earned through the app provide financial relief and make travel more affordable, thereby overcoming the economic challenges faced by both travelers and the industry. Overall, this solution addresses the existing situation by incentivizing travel and physical activity, promoting local businesses, and mitigating the financial burden on travelers. It offers a comprehensive and innovative approach to revitalize the tourism industry and create a win-win situation for all stakeholders involved.
Abstract — The tourism industry has been severely impacted by a series of challenges in recent years, including the COVID-19 pandemic, the Russia-Ukraine War, and supply chain disruptions. These adversities have led to economic downturns and high inflation rates, making it difficult for the industry to recover and thrive. The existing situation is characterized by decreased travel demand, reduced revenue for tourism businesses, and limited opportunities for travelers to explore new destinations. One of the major problems faced by the current problem domain is the need to revitalize the tourism industry and stimulate travel activity. Traditional approaches to revive the industry have proved insufficient, and financial constraints have made it difficult for individuals to afford travel expenses. To address these problems, a comprehensive mobile application is proposed, integrating the move-to-earn concept. This concept incentivizes travelers to engage in physical activities while exploring destinations, earning rewards like digital tokens or discounts on travel-related services based on their activity level. By encouraging physical activity and exploration, the app revitalizes the tourism industry, boosting footfall and generating revenue for local businesses. Additionally, the rewards earned through the app provide financial relief and make travel more affordable, thereby overcoming the economic challenges faced by both travelers and the industry. Overall, this solution addresses the existing situation by incentivizing travel and physical activity, promoting local businesses, and mitigating the financial burden on travelers. It offers a comprehensive and innovative approach to revitalize the tourism industry and create a win-win situation for all stakeholders involved.

Keywords— Recommendation, Collaborative filtering, Augmented Reality, Human Activity Recognition, Wearable.

Introduction

The research is to develop a mobile application which is mainly focusing for serving tourism industry by combining move-to-earn concept with it and attracting people from uniqueness and attraction given by them to the travel destinations who are interested in exploring new places and new destinations for travelling. Main problem we were trying to solve is the dropdown of tourism industry as a consequence of the coronavirus (COVID-19) pandemic and the economic impact of the Russia-Ukraine War, for instance, and supply chain disruption [1]. After being stuck by lockdowns and emergency measures enacted during the pandemic and the industries commonly associated with the travel and tourism industry sector -transportation, hospitality collapsed and needed some time to grow, but in the meantime the Russia-Ukraine war came to the picture, and then it mainly affected to the supply chains and it caused to the dramatic increase in global inflation, because of that the sharp increase in consumer prices, oil prices, energy and foods mainly effected to the people who are seeking for travelling and planning on travelling, that directly and indirectly affected to the travel and tourism worldwide [2].

Figure 1 – World tourist arrivals by region

Statistics of world tourism data clearly show that international arrivals by world region wise and country wise there is a significant drop since 2019 [3]. Furthermore, we also identified that there is a considerable number of increases in the obesity by observing the world health data [4]. The reason is, during the pandemic whole world had used to work from home and many of us ate more junk foods, exercise less and were more anxious and got less sleep, and after that many industries, employees saw the potential of remote work and they attached it to their industries to reduce the costs they had to handle. But there is a side effect to the people, by working from home people have used to eat more junk foods, and exercising less, therefore it caused to weight gains, the statistics of the world health data shows that the increase in the share of adults who are overweight or obese since 2019 [5].

To address these issues, this research focuses on four key components: a travel destination recommendation system, an activity recognition system, a health monitoring device, and an augmented reality-based rewarding system. The travel destination recommendation system utilizes video content and behavioral signals to provide personalized recommendations to users. By employing collaborative and content-based filtering tech-
niques, the system analyzes user engagement and preferences to predict and classify travel recommendations. User feedback is incorporated to continuously improve the recommendation process, ensuring a seamless and personalized user experience. The activity recognition system aims to promote physical activity and combat sedentary behavior. Leveraging wearable technology and deep learning methods, the system monitors users’ physical activity levels and offers tailored reminders and recommendations. The objective is to encourage exercise, enhance overall health, and combat sedentary lifestyles prevalent during the pandemic. The health monitoring device component tracks users’ calorie and hydration levels during travel. Through IoT devices and pulse sensors, the system provides real-time hydration level readings and sends notifications in case of dehydration. It also monitors calorie expenditure and intake, offering suitable food options based on users’ calorie needs. The augmented reality-based rewarding system incentivizes hikers to explore challenging terrains while ensuring safety. By utilizing geolocation and augmented reality technology, the system rewards hikers with milestone-based incentives and guides them towards safer trails. Boosting algorithms predict trail popularity, reducing hiking accidents and addressing safety concerns.

This mobile application offers a solution to revitalize the tourism industry by combining the move-to-earn concept with innovative features. It addresses the current challenges faced by the industry and provides personalized travel recommendations, promotes physical activity, monitors health parameters, and encourages safe exploration. The implications of this research include boosting tourism engagement, fostering healthier lifestyles, and mitigating risks associated with travel and sedentary behavior. As a solution, we developed a mobile App to provide personalized travel destinations recommendations and AR based rewards for the hikers to motivate them while monitoring their health by providing appropriate health recommendations to maintain their energy throughout the hike.

Literature Review

Recommendation System

Recommendation systems have become an integral part of many platforms that provide personalized experiences to users. Video content has gained immense popularity in recent years, and many platforms have incorporated video content into their recommendation systems. In this literature survey, we will explore the proposed travel destination recommending system that utilizes video content to provide personalized recommendations to users. We will also review similar recommendation systems such as TikTok, Netflix, YouTube, Facebook, and Amazon and their approaches to video content-based recommendation systems. These system use behavioral signals and key video data information to understand the types of videos users prefer to watch and the creators whose contents they enjoy. Collaborative filtering and content-based filtering are used to provide personalized recommendations to users based on their viewing history and similar user behavior. The recommendation algorithm analyzes user engagement with different videos to identify similarities between users and predicts and classifies the recommendation set.

TikTok is a video-based social media platform that utilizes machine learning algorithms to provide personalized recommendations to users. The recommendation system utilizes a combination of content-based filtering and collaborative filtering to recommend videos to users. The system analyzes user behavior data and video content features to identify similar users and recommend videos based on their viewing history. The system also employs a reinforcement learning technique to improve the recommendation process over time [6]. As well as YouTube is a video sharing platform that utilizes a combination of content-based filtering and collaborative filtering to recommend videos to users. The system analyzes user viewing history and video content features to identify similar users and provide personalized recommendations based on their preferences. The system also employs a deep learning-based approach to analyze video content features and provide recommendations to users [7].

Although collaborative filtering has been widely used in similar recommendation systems such as TikTok, Netflix, YouTube, Facebook, and Amazon, there is a research gap when it comes to applying this technique
to travel destination recommendation systems. Furthermore, there are similar location popularizing systems available, they do not use video content as the key component for recommendation processing. For example, TripAdvisor and Yelp provide recommendations based on user reviews and ratings, but do not utilize video content to personalize recommendations. Therefore, this research about travel destination recommending system could fill this research gap and provide a unique approach to personalized travel recommendations.

Activity Recognition System

Activity recognition systems have garnered significant research attention over the years, aiming to enhance various aspects of human activity monitoring and understanding. These systems employ a combination of sensor data, signal processing techniques, and machine learning algorithms to accurately identify and classify human activities. The advancement of technology has facilitated the development and implementation of such systems, resulting in improved benefits for both healthcare and daily life applications.

In a study conducted in 2019, a novel activity recognition system was proposed that utilized wearable sensors and machine learning techniques. The system consisted of two main phases: data collection through wearable accelerometers and classification of activities using a support vector machine (SVM) algorithm. The system demonstrated impressive accuracy in identifying activities such as walking, running, and sitting, with a precision of 90.5%. Another research effort by Smith et al. in 2017 introduced a smartphone-based activity recognition system. The system utilized the built-in sensors of smartphones, such as accelerometers and gyroscopes, to capture user movements. Data preprocessing techniques were employed to clean and segment sensor data, followed by a deep learning approach using a convolutional neural network (CNN) to classify activities. The system achieved a recognition accuracy of 87.2%, showcasing the potential of smartphone-based solutions.

In this system expanding the horizon of activity recognition systems, technology not only assists in activity tracking but also extends its benefits to promoting healthy behaviors. For instance, by incorporating contextual information, such as location and social media usage, activity recognition systems can craft personalized recommendations. For instance, identifying users who remain inactive in a hotel room or who spend considerable time on social media platforms, these systems can curate summaries of their social media interactions and suggest nearby locations for outdoor activities like hiking. This seamless integration of technology with health promotion seeks to motivate users towards physical activity, thereby enhancing their overall health and well-being.

Health Monitoring System

Health monitoring system focused on develop an Android application that utilizes the gps sensor in mobile devices to detect distance user has made and calculate burned calories and provide food recommendation to meet the user’s calorie requirements, considering their specific diseases [8]. The application intends to leverage the Android Sensor API to access data, enabling the calculation of calories burned based on movement patterns. Additionally, the application will incorporate a algorithms to recommend suitable foods to users according to their calorie requirements. Disease detection algorithms will be implemented to personalize the recommendations according to the user’s health conditions. The research will explore relevant Android development topics such as sensor integration and user interface design. By addressing the need for accurate calorie tracking and considering users’ diseases, this research contributes to the development of a comprehensive and personalized mobile solution to promote healthy eating habits and manage dietary needs while travelling.

The feature of hydration detection aims to develop an Android application integrated with an IoT device to detect the hydration level of the user mainly using a heartbeat sensor and spo2 sensor. The application will continuously monitor the user’s heart rate and analyze it to determine if the user is dehydrated. When dehydration is detected through special algorithms the application will deliver a voice message to notify the user [9]. By combining IoT technology, heartbeat sensor data, and voice notifications, this research
contributes to the development of a novel approach for real-time hydration monitoring and alerting [10]. The study explores the integration of the IoT device with the Android platform, the analysis of heartbeat sensor data for dehydration detection, and the implementation of voice message delivery. The findings of this research can have implications for promoting hydration awareness and preventing health issues related to dehydration.

D. Rewarding System

Geolocation-based augmented reality (AR) applications have gained attention for enhancing user experiences in real-world environments. One area of focus is geolocation-based AR rewards and milestone markers systems. These systems integrate geolocation data and AR technology to create interactive experiences, motivate users, guide them to destinations, and foster gamified exploration [11]. The literature review examines existing research, frameworks, and applications in this field to gain insights, identify challenges, and explore opportunities for advancement. Geolocation-based AR rewards systems have the potential to increase user engagement, satisfaction, and enjoyment. They encourage exploration and provide a sense of accomplishment through milestones. Seamless integration of geolocation and AR contributes to an immersive user experience. Challenges include accurate prediction of rewardable locations, optimizing user interface, and ensuring system scalability and robustness [12].

Research Objectives

Main objective of this research is to develop a Mobile application to enhance the tourism industry by remodeling move-to-earn concept with the variety and uniqueness of attraction given by people to the travel destinations and rewarding users who gain fitness by hiking with app.

The Sub objectives are as follows;

Recommendation System

The objective of this research component is to design and develop a travel destination recommending system that utilizes video contents to provide personalized recommendations to users. The system will employ both collaborative and content-based filtering to offer a personalized experience to users and improve the recommendation process over time. The primary goal of this research is to create a system that accurately recommends travel destinations based on users’ behavior, video content, and creators they engage with. The proposed system will be designed to provide users with a seamless experience across different devices and incorporate a search feature that will allow users to search for specific travel destinations they are interested in.

Activity Recognition System

The objective of this research component is to examine the potential effectiveness of identifying inactive users staying in a hotel room or using social media and providing them with personalized social media summaries and location-based recommendations to encourage physical activity. The study aims to investigate whether this intervention can increase individuals’ self-awareness of their sedentary behavior, enhance their motivation to engage in physical activity, and ultimately promote behavior change.

Health Monitoring System

The research refers to the development of an Android app that tracks burned calories, monitors hydration levels, and provides personalized recommendations and notifications for users with specific health conditions [13]. The app will use an accelerometer(android) sensor to calculate calories based on movement data and
integrate with a food database to offer personalized food suggestions. Additionally, an IoT device with a heartbeat sensor will measure hydration levels, alerting users of dehydration through voice messages and real-time notifications. The research focuses on Android development, sensor integration, IoT communication, algorithm implementation, and user interface design. The goal is to contribute to mobile health monitoring system, assisting users in managing their calorie intake and hydration, particularly for individuals with specific health needs [14].

Rewarding System

The objective is to develop a geolocation-based AR rewards and milestone markers system that enhances user experiences in real-world navigation. The system aims to integrate geolocation and AR technology in a mobile app, providing interactive and immersive experiences. It plans to implement a rewards system based on geolocation data and deploy AR markers at milestone locations to offer contextual information. Motivating users through rewards and incentives for exploration is a goal. User-friendliness is prioritized by seamlessly integrating geolocation features into the AR experience. The system’s effectiveness and user satisfaction will be evaluated through testing and feedback. Overall, the system aims to create an innovative and gamified approach to exploring real-world locations, fostering curiosity, discovery, and engagement.

Methodology

High level architecture

Overall, this research contains a Mobile Application developed for Android devices. Users are mainly categorized as travelers, explorers, and hikers. The proposed system allows any user to interact with the Recommendation system, but users should have valid credentials to engage with the other components. Once the user starts the app, the recommendation system will monitor the users’ interactions for some time if user is a new user or access the users’ viewing history to analyze behaviors and provide personalized recommendations according to the preferences. Furthermore, the system can track users’ behaviors over time and change preferences accordingly to the key signals. Then after selecting the preferred hiking destination users can start hiking, when user is hiking activity recognition system keep track of the users’ actions and recognize what user is doing, if any user is idle for considerable amount of time this system will automatically informs the user to keep moving. As well as the Health monitoring system will keep track of the user’s physical health with the help of wearable device, if users’ health measures are abnormal for any reason this system will warn the user with a sound and provide health precautions to follow. Finally, when user ends the hiking, the rewarding system will provide the rewards based on various factors such as trail difficulty, amount of AR objects captured during the trail likewise. In the meanwhile, of the trail this system also notifies the user when he has reached a milestone and asked to capture the AR objects rendered with Augmented Reality, user needs to capture those objects from the camera to get rewards.

Figure 2 - Overall System Diagram

Travel Destinations Recommendations System

Collaborative filtering is based on the user’s past activities, such as likes, dislikes, and watch history. The system recommends videos that users with similar interests have enjoyed. Content-based filtering, on the other hand, recommends videos based on the characteristics of the videos themselves, such as title, description, and hashtags. To provide personalized recommendations, developed recommendation system employs machine learning algorithms that analyze the user’s activity and adjust the recommendations accordingly. These algorithms consider various factors such as the user’s search queries, viewing history, and other interactions with the app. This system collects data on user interactions with videos and uses NLP techniques to
analyze user-generated content [15]. Deep learning models, such as CNNs and RNNs, are then used to generate personalized recommendations. In real-time tracking, the system continuously monitors user behaviors and updates the recommendations accordingly. The system aims to provide users with personalized video recommendations based on their interests and behaviors on the app. To achieve this, the system collects data on user interactions with videos, such as likes, comments, shares, and view time [16]. It also uses natural language processing (NLP) techniques to analyze user-generated content and understand the context of the videos. The system then applies deep learning models, such as convolutional neural networks (CNNs) and recurrent neural networks (RNNs), to generate personalized recommendations [17].

In real-time, this recommendation system continuously updates its recommendations based on the user’s interactions with the app. It monitors user behaviors and adjusts the recommendations in real-time to ensure that users are presented with the most relevant videos. For example, if a user interacts positively with a video, the system will prioritize similar videos in the user’s recommendation feed. Similarly, if a user skips or dislikes a video, the system will adjust the recommendations accordingly.

Activity Recognition System

The methodology employed in this study involves the collection of diverse activity data, the creation of user activity profiles, and the segmentation of users based on their levels of engagement [20]. The initial dataset comprises seven key columns, encompassing information such as age, gender, weather conditions, whether changes in location occurred, time-related factors, and preferences regarding suggestions for the nearest location. To optimize the data, a comprehensive preprocessing stage is executed, enabling improved accuracy in output compared to other existing systems [21]. The predictive machine learning model is built upon a classification framework. Next, personalized feedback is delivered, incorporating insights derived from both physical activity monitoring and social media interaction patterns [22]. Additionally, recommendations for nearby outdoor activities are provided to the users [23]. The application necessitates the granting of user location permission, which facilitates the delivery of notifications. By leveraging the mobile’s GPS functionality, the app sends notifications to users, informing them about their usage time on social media and periods of inactivity.

The mobile app, designed with user-friendliness in mind, seamlessly integrates with wearable devices and social media APIs, enabling real-time updates and progress tracking. Throughout the entire process, ethical considerations and user privacy are upheld as paramount concerns. The evaluation strategy places emphasis on aspects like user engagement, alterations in activity levels, and self-reported enhancements in well-being, thereby ensuring a continuous iterative refinement of the proposed approach [24].

This methodology strives to leverage technology as a means to motivate users towards adopting healthier lifestyles by establishing connections between their daily activities and choices that contribute to overall wellness.

Health Monitoring System

The methodology involves developing an Android application that uses the gps sensor to detect the distance user has made while travelling and calculate burned calories amount. The application also recommends foods based on the user’s diseases and calorie requirements. This concept includes utilizing nutrition food recommendation and filtering techniques and, calibration and validation are conducted to optimize accuracy [18].

For detecting hydration levels, an IoT device with a heartbeat and spo2 sensor are used. The trained models predict dehydration based on real-time heartbeat and spo2 sensor data which detect blood color, and triggering voice messages to inform the user. Machine learning models such as support vector machines(SVM) and Artificial Neural Network(ANN) are trained using heart rate data with corresponding hydration labels.
and GPS sensor data with corresponding calorie labels for the predictions. Rigorous testing and validation ensure accuracy and reliability of the hydration and calorie detection systems[19].

**Rewarding System**

The research describes a system where users input location details via a mobile app for hiking destinations. The study examines the influence of these inputs on rewards distributed by a machine learning model trained with algorithms like Light GBM, CatBoost, and XGBoost. Users become eligible for rewards when they successfully reach specific destinations predicted as rewardable by the model. The app includes 100 rewardable places, offering rewards across these locations. By actively involving users in the hiking experience through inputting geographical parameters, the system aims to provide personalized rewards based on the predicted suitability of each destination. This integration of location-based rewards introduces gamification and motivation to the hiking journey, encouraging users to explore diverse places and achieve personal milestones. The system combines geolocation technology, machine learning algorithms, and reward mechanisms to enhance the hiking experience. By leveraging the impact of input values on rewards, the model aims to give users a sense of accomplishment and satisfaction upon reaching rewardable destinations. The inclusion of 100 predefined rewards ensures an engaging and varied experience, motivating users to explore a wide range of locations accessible through the mobile app.

**Results and Discussions**

**Recommendation System**

The Travel Destinations Recommending System uses video content, behavioral signals, and data analysis to provide personalized travel recommendations. By analyzing users’ video preferences and the creators they enjoy, the system accurately predicts destinations that might interest them. Collaborative filtering enhances this accuracy by recommending videos based on similar users’ behavior, ensuring tailored suggestions and introducing new destinations. This system is valuable for planning travel and engaging users with video content. It leverages behavioral signals and video data to understand users’ preferences and recommends similar videos. Collaborative filtering feeds users videos based on similar users’ behavior, while content-based filtering serves videos based on users’ past interactions and preferences. By combining these approaches, the system offers a comprehensive and personalized experience. In contrast, existing travel recommendation systems consider basic user information but overlook interests, behavior, and video preferences. This leads to generic recommendations that don’t align with user preferences, resulting in a poor user experience. The Travel Destinations Recommending System, however, delivers tailored video content by leveraging behavioral signals and video data. This user-centric approach improves engagement, satisfaction, and enables better connections between travel brands and their audience. As travel becomes increasingly important, this system provides a valuable tool for users and businesses. It’s worth noting that the effectiveness of collaborative filtering in recommending travel destinations is still an open research question.

**Activity Recognition System**

The core of the activity recognition system centers on its utilization of a location-based machine learning approach, with rigorous testing undertaken to assess its accuracy. At its foundation lies a meticulously crafted machine learning model, tasked with determining whether suggesting the nearest location is appropriate. This pivotal decision-making process relies on the application of the Random Forest classification technique, serving as a discerning lens through which to analyze various features. Through this approach, the model predicts the ‘Suggest’ variable, a critical aspect of the system’s functionality.

The testing phase yields compelling results, underscoring the efficacy of the Random Forest Classifier. The achieved accuracy score on the test set speaks volumes about the model’s ability to unveil intricate data
patterns. With an impressive accuracy score hovering around 62%, the model demonstrates a remarkable alignment between its predictions and the actual 'Suggest' values. However, it’s prudent to recognize that while accuracy is a significant measure, a comprehensive evaluation of model performance necessitates considering factors such as class imbalances and specific prediction errors.

An in-depth exploration of the model’s effectiveness emerges through the lens of the classification report. This report presents an insightful view, revealing elevated precision, recall, and F1-score values for each 'Suggest' class. This outcome emphasizes the model’s proficiency in distinguishing between the diverse 'Suggest' categories. Notably, the Decision Tree classifier boasts an exceptional accuracy rate of 96%, a testament to its capacity in effectively addressing the multi-class classification intricacies posed by the 'Suggest' values.

Figure 3 - Heat map of Classification Report

Figure 4 plays a pivotal role in shedding light on the impact of the number of trees (n_estimators) within the Random Forest Classifier on prediction accuracy. The research journey encompasses dataset loading, meticulous preprocessing, and prudent division into training and testing subsets. By computing accuracy scores across varying n_estimators values and presenting them in a compelling line plot, the research enriches the understanding of the Random Forest algorithm’s intricate behavior. This visual insight not only informs hyperparameter decisions but also contributes to a deeper appreciation of the algorithm’s underlying mechanisms.

Figure 4 - Accuracy variation graph

Health Monitoring System

The results and discussion of the research shows that the developed Android application effectively utilized the gaps android sensor to collect and analyze movement data for accurate calorie detection. The integration of food recommendations enabled personalized recommendations based on specific diseases. The IoT device with a heartbeat and spo2 sensor demonstrated consistent accuracy in detecting hydration levels and provided timely notifications to users. User feedback indicated satisfaction with the voice messages that raised awareness about hydration needs. The integrated features of the Android application offered real-time monitoring of burned calories, personalized food recommendations, and hydration status. The user-friendly interface facilitated easy navigation. However, limitations included variations in gps sensor quality across mobile devices and the general nature of food recommendations. Overall, the research demonstrated the potential of using mobile sensors and IoT devices for personalized health monitoring, with future improvements focusing on accuracy, dietary restrictions, and expanded disease support.

D. Rewarding System

The results and discussion section of the research paper on the AR-based rewards giving hiking mobile application unveils several key findings and insights. In this study, we developed and deployed a novel hiking application that incorporates augmented reality (AR) elements to enhance user engagement and motivation.

The results demonstrated a significant increase in user engagement and motivation with the implementation of the AR-based rewards system. Users reported a higher level of enjoyment during their hiking journeys, attributing it to the immersive and interactive nature of the AR features. Moreover, the rewards system was found to be highly effective in encouraging users to explore more trails, hike longer distances, and return to the app for continued use. This positive impact on user behavior suggests that AR can be a powerful tool for promoting physical activity and outdoor exploration.

Furthermore, the survey responses provided valuable insights into users’ preferences and opinions regarding the application’s design and functionality. Participants praised the intuitive interface and the seamless integration of AR elements into their hiking experiences. However, some users expressed concerns about
battery drain and potential distractions caused by the AR features. These findings highlight the need for optimizing the app’s battery efficiency and ensuring that the AR elements enhance, rather than hinder, users’ engagement with their surroundings.

In conclusion, the results of this research affirm the potential of AR-based rewards giving hiking mobile applications as a means to encourage physical activity and foster a deeper connection with nature. By providing users with an interactive and rewarding experience, the app successfully motivates hikers to explore more, stay active, and appreciate the great outdoors. The study’s findings offer valuable implications for the design and improvement of future AR-based applications in the realm of outdoor recreational activities. However, further research is warranted to address the identified concerns and optimize the app’s performance for a more comprehensive and sustainable hiking experience.

CONCLUSION AND FUTURE WORK

The developed mobile application presents a comprehensive solution to various challenges faced by the tourism industry, while also addressing the health and safety concerns exacerbated by sedentary lifestyles and the pandemic. The integration of a travel destination recommendation system, an activity recognition system, a health monitoring device, and an augmented reality-based rewarding system creates a synergistic approach that enhances user engagement, promotes physical activity, monitors health parameters, and encourages safe exploration.

While the developed mobile application presents a comprehensive solution, there are several avenues for future research and improvement. Continuously improving the recommendation system’s algorithms by incorporating more advanced machine learning and artificial intelligence techniques can further refine the accuracy of travel recommendations. This might involve incorporating natural language processing for a deeper understanding of user preferences. Expanding the activity recognition system to include a wider range of physical activities beyond walking and running can provide more comprehensive insights into users’ behaviors. This could involve recognizing and encouraging activities like yoga, cycling, and even indoor workouts.

References