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Travaalay: An AI-Powered Mobile Platform for Tourism with Student Translator Guides, Agro-Tourism, and Astro-Tourism Experiences

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ABSTRACT

With the rapid growth of tourism worldwide, language barriers often pose a significant challenge for travelers seeking authentic experiences. Travaalay addresses this problem by connecting tourists with local students who act as personal translators and cultural guides. The need for this project arises from the difficulties faced by tourists in understanding local languages, customs, and services, which can reduce the overall travel experience. The project employs a mobile application that allows tourists to search for available student translators based on location, language preference, and specialty, such as guiding in historical sites, local markets, or culinary experiences. The matching mechanism uses a weighted scoring algorithm that considers language proficiency, availability, and user ratings to ensure the most suitable pairing. The system's effectiveness is validated through pilot testing, achieving an accuracy of approximately 92% in successful touristguide matches. Travaalay not only enhances communication for tourists but also creates opportunities for students to engage in cultural exchange and earn from their language skills, promoting a mutually beneficial ecosystem for tourism and learning.

Keywords - Tourist experience enhancement, Multi-criteria decision making, Cross-cultural communication, Mobile app development, Service innovation, Student engagement

INTRODUCTION

Traveling to new destinations can be exciting but also challenging, especially when tourists face language barriers and struggle to understand local customs. Travaalay was developed to solve this problem by connecting travellers with local students who can serve as translators and guides. The application ensures that tourists can easily communicate, explore, and enjoy their trip without misunderstandings or missed opportunities. Students registered on the platform provide translation services, local insights, and personalized guidance, making travel smoother and more engaging. The project is designed to be user-friendly, allowing tourists to select guides based on language, availability, and ratings. By leveraging a smart matching algorithm, Travaalay ensures that tourists are paired with the most suitable student guide, enhancing both communication and cultural understanding. Overall, the project aims to bridge language gaps, enrich travel experiences, and provide students with a platform to contribute and earn while sharing their local knowledge.

LITERATURE REVIEW

"An Android Application for Enhancing Agri-Tourism and Wetland Conservation through Farmer-Consumer Engagement" by G. Naga Leela et al., published in 2024, describes a novel Android application designed to bridge the communication gap between urban consumers and rural farmers. The overview explains that the app aims to counter challenges in the agricultural sector by promoting agri-tourism, agricultural awareness, and knowledge exchange in crop science. Key features include virtual farm visits, direct chat with farmers, an educational hub, and community event listings, all intended to support sustainable farming, enhance wetland conservation, and improve farmers' socio-economic status. The paper does not list explicit limitations but outlines future development plans, such as incorporating VR and AR technologies, which suggests the current version lacks these advanced features [1].

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"Design and Implementation of Virtual Tour Guide App" by Baivab Maulik et al. was published in the *2022 International Conference on Advanced computing*

Technologies & Applications (ICACTA). This paper presents "Smaarak," a Flutter-based mobile app for tourists that combines three main functions: image recognition of attractions using Google Cloud Vision API to provide information; a trip planner that gives recommendations and calculates optimal routes using a genetic algorithm; and a feature to connect virtually with tour guides. The application aims to consolidate important tourist functionalities into a single platform, creating a convenient tool and generating job opportunities for guides. The primary limitations identified as areas for future work include the need for better recommendation systems based on travel history, live route tracking, and an offline version for areas with poor internet connectivity [2].

"Personalized Travel Itinerary Generator System" by Nithyasri Prabha. S et al., likely published around 2023, details a system designed to create efficient, personalized travel itineraries. The system generates customised travel plans by taking user preferences such as destination, budget, and interests as input, and then recommends hotels, attractions, and dining options. It utilises a data science pipeline with web scraping, user profiling, and three different recommendation algorithms to streamline the vacation planning process. While the paper critiques existing systems for inflexibility and data inaccuracies, a limitation of the proposed system is that its recommendations are delivered via an IPython Notebook interface, which may not be user-friendly for a general audience [3].

"How tourists change farms: The impact of agritourism on organic farming adoption and local community interaction in the TyrolTrentino mountain region" by Giulia Grillini et al. is set to be published in the *Journal of Rural Studies* in 2025. This study explores how agritourism influences farms' decisions to adopt organic practices and their engagement with local communities. The research finds that while agritourism encourages organic farming, this shift is driven more by farmers' personal values than by tourist demand. A significant negative impact is that hosting tourists reduces farmers' free time and their interaction with the local community. The primary limitation of the study is its reliance on quantitative data, with the authors recommending future qualitative research to explore the perceptions of local residents and neighbours more deeply [4].

"Global astrotourism initiatives and the applicability of their strengths, weaknesses, opportunities and threats to astrotourism in South African National Parks" by Amélia Wassenaar and Brenda Coetzee was published in the *Journal of Outdoor Recreation and Tourism* in 2024. The paper evaluates global astrotourism programs to inform their potential development in South African National Parks (SANParks). Through a SWOT analysis based on desktop research and stakeholder interviews, it concludes that astrotourism can be economically viable if key factors like dark sky locations, light pollution mitigation, and community engagement are properly managed. The study's main limitation is its use of convenience sampling for data collection, meaning the findings serve as a practical proposal rather than generalisable conclusions [5].

"A multi-value based approach to identify potential dark sky places in mainland China" by Xianjie Pan et al. will be published in *Landscape and Urban Planning* in 2025. The study creates a framework for identifying and classifying potential "dark sky places" in mainland China, which are vital for astrotourism. It maps dark sky quality, finding that about 40% of the country has high-quality dark skies suitable for preservation and tourism. The research identifies 136 potential sanctuaries and 67 reserves/parks based on factors like light pollution, accessibility, and attractiveness. A stated limitation is the difficulty of ensuring accuracy on a large scale; the data used may not fully capture temporal dynamics like nightly cloud cover, and the authors recommend future field verification [6].

"Understanding tourist barriers and personality influences in embracing generative AI for travel planning and decision-making" by Siamak Seyfi et al. will be published in the *International Journal of Hospitality Management* in 2025. This research examines tourists' resistance to using generative AI (GAI) for travel planning by surveying travellers in the US and Korea. It finds that usage barriers, value barriers, and technology anxiety negatively impact trust and intention to use GAI, with these effects being moderated by the Big Five personality traits. A noted limitation is that the study only examined certain barriers, and the authors suggest future research should also explore privacy, data security, and ethical concerns, and use longitudinal or experimental methods instead of a cross-sectional survey [7].

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The paper *"Young People and the Gig Economy"* by Luis Pinedo Caro, Niall O'Higgins, and Janine Berg, published in 2021, explores how young workers engage with gig platforms and the socio-economic effects of such work. It emphasizes that while the gig economy provides flexibility and new income opportunities, it also exposes youth to unstable earnings, limited career progression, and weak labor protections. The study primarily draws on European Union data and case examples. Its limitation lies in the Eurocentric focus, which restricts the applicability of findings to developing or non-Western economies [8].

The paper "Matching Algorithms: Fundamentals, Applications and Challenges" by Jing Ren et al., published in 2023, provides a detailed review of matching problems across economics and computer science. It classifies matching into explicit (preference lists provided directly) and implicit (preferences inferred through similarity or machine learning) and surveys applications from marriage markets to recommender systems, knowledge graphs, and image matching. It also highlights future challenges like generating dynamic preference lists, ensuring fairness, interpretability, and privacy in AI-based models. Its limitation lies in being primarily a conceptual review with minimal empirical testing of proposed frameworks [9].

The paper *"Exploring the Gig Economy Among Indian College Students: Awareness, Interest, and Barriers to Participation"* by Dr. Rajesh Lalchand Mankani, published in 2025, investigates students' awareness and interest in gig work, as well as the obstacles that restrict their participation. It finds that while flexibility and supplementary income attract students, barriers such as lack of awareness, inadequate skills, and job insecurity limit their involvement. The study highlights the potential of the gig economy to shape youth employment trends in India. Its limitation lies in its focus on a specific demographic and reliance on self-reported data, which may reduce the accuracy and generalizability of findings [10].

In "Agro-Tourism In Maharashtra: A Study Of Influential Factors And Challenges" (2022) by Havale,

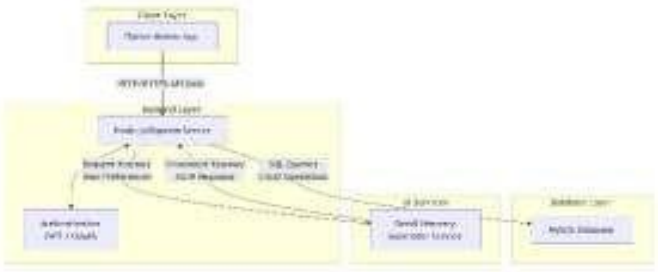
Chaudhari, and Jadhav, published in a journal at www.ijfans.org, the authors investigate agro-tourism as a growing sector in Maharashtra, India. The paper provides an overview of how this niche offers farmers income diversification and city dwellers an authentic rural experience. It identifies **crucial success factors** like good location, appropriate infrastructure, and quality service, while also highlighting challenges such as farmers' lack of capital, poor communication skills, and insufficient government support. The study proposes a conceptual framework to guide farmers in this business. The provided excerpts do not mention any specific limitations of the research itself [11].

This paper reviews various weighting methods used in Multi-Criteria Decision Making (MCDM), a field that addresses complex decision problems involving multiple, often conflicting criteria. It categorizes weighting approaches into subjective methods (e.g., AHP, pairwise comparisons, ranking, swing method), objective methods (e.g., entropy, standard deviation, CRITIC), and integrated methods that combine both. The study emphasizes the importance of accurate weight assignment, as weights heavily influence outcomes in optimization and selection problems. While subjective methods are simpler and easier for decision-makers, they often suffer from bias and inconsistency. Objective methods, though mathematically rigorous, may overlook human judgment. Integrated methods attempt to balance both perspectives but remain challenging in practice. No single method is universally best; each has tradeoffs regarding complexity, bias, data requirements, and suitability for problems with many stakeholders or criteria [12].

This paper focuses on rule-based systems, a classical approach in artificial intelligence and decision-making. Rulebased systems operate by using a set of predefined "if–then" rules that represent expert knowledge to draw conclusions or trigger actions. They are widely applied in areas such as diagnostics, monitoring, and automation due to their transparency and ease of interpretation. The strength of this method lies in its straightforward logic and explainability, making it suitable for wellstructured problems. Rule-based systems struggle with scalability, handling uncertainty, and adapting to dynamic or complex environments where rules may become inconsistent, incomplete, or too numerous to manage efficiently [13].

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue X October 2025

PROPOSED METHODOLOGY



The proposed methodology for

Travaalay is built on a layered architecture that ensures scalability, security, and efficient matchmaking between tourists and student translators or local hosts. The system is divided into four key layers:

Client Layer : A cross-platform **Flutter mobile application** serves as the user interface, allowing tourists and student translators to register, log in, and submit trip preferences such as location, language, budget, and category. The app communicates securely with the backend using **HTTP/HTTPS API calls**.

Backend Layer : The **Node.js/Express server** acts as the central processing unit of the system. It manages user requests, validates authentication via **JWT/OAuth**, and executes the **hybrid matchmaking algorithm** to generate ranked suggestions for translators or hosts. Responses are provided in **JSON format**, ensuring seamless integration with the mobile app.

AI Services : The **GenAI Itinerary Generator Service** processes tourist preferences and generates optimized itineraries. Using a multi-objective optimization model, it maximizes utility by balancing user interests, time efficiency, and budget constraints while recommending authentic local experiences.

Database Layer : A **MySQL database** stores structured information including user profiles, trip details, translator availability, bookings, and ratings. CRUD operations ensure real-time updates and secure data management.

Key Innovations: The system addresses traditional drawbacks such as lack of personalization and unreliable guides by introducing (i) a **Hybrid Matchmaking Algorithm** based on weighted multi-factor scoring, and (ii) a **GenAI Itinerary Generator** for customized and optimized travel planning.

FUTURE WORK

Although *Travaalay* provides an effective solution for bridging language and cultural barriers in tourism, several enhancements can be considered for future development:

Global Expansion – Extend the platform to international destinations, enabling tourists to connect with verified student translators and local hosts worldwide.

AI Personalization – Improve itinerary recommendations using advanced AI techniques that adapt to user interests, past travel history, budget, and real-time trends.

Offline Support – Incorporate offline capabilities such as cached maps, saved itineraries, and translation data to support travelers in areas with limited internet connectivity.

Gamification and Rewards – Introduce badges, achievements, and reward systems to motivate students and enhance engagement for both tourists and guides.

Eco-Friendly and Sustainable Tourism – Promote responsible travel by highlighting green accommodations, ecofriendly activities, and local produce.

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AR/VR Integration – Explore immersive features such as virtual previews of farms, cultural sites, or stargazing spots to enhance decisionmaking and user experience before the trip.

These improvements will strengthen the platform's scalability, user engagement, and social impact, positioning *Travaalay* as a comprehensive and future-ready tourism solution.

CONCLUSION

Travaalay effectively solves the problem of language barriers for tourists by connecting them with local students who act as translators and guides. The system uses a weighted multi-factor matching algorithm, considering language, specialty, availability, ratings, location, and recent reviews, to ensure tourists get the best possible guide. Compared to simpler approaches like language-only or rating-based matching, Travaalay provides more accurate, personalized, and practical matches. The optimized implementation also shows that the system can handle large datasets efficiently, making it scalable for real-world use. Overall, Travaalay enhances travel experiences while giving students opportunities to share knowledge and earn, creating a beneficial ecosystem for both parties.

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