LAKAD: A PERSONALIZED MOBILE ITINERARY CREATOR WITH FOCUS IN BULACAN TOURISM

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CHAPTER I

PROBLEM AND ITS BACKGROUND

Itinerary planning is an important process that can enhance the experience of tourists in their travel such as how well the places interest the user and the flow in which the places are traversed. In the case of the province of Bulacan, this study seeks to propose a mobile personalized itinerary generator as a possible solution to optimizing existing itineraries and providing rich and personalized itineraries of Bulacan tourism, based on the interests of the user. This chapter introduces the background, objectives, significance, and scope of the study.

Background of the Study

In the midst of global advancement in technology and sciences, culture remains a vital part of many people's lives around the world, and so are the habits they have in connection to it. Tourism, being a significant contributor to economic progress, preservation of culture, and local development, relies heavily on how well travel experiences are organized and delivered. One of the most crucial aspects of this process is itinerary planning, a practice which ensures that tourists can maximize their time while visiting multiple points of interest efficiently, and enjoy the variability of a place without unnecessary inconvenience. The ability to create a structured travel plan does not only influence convenience but also impacts tourist satisfaction and chance of returning or recommending the destination to others.

Some historical and cultural destinations in Bulacan remain neglected despite the province's rich heritage, proven by how some cultural heritage sites like Barasoain Church and the Basilica Minore de Immaculada Conception, attract and often have more visitors than others like the Meyto Shrine of Calumpit, respectively these destinations had 78, 30, and 10 visitors, collected among 100 respondents (Canet & Sunpongco, 2025). Thus, promotion of tourism, and by extension, the development of tools that can improve it

is a vital aspect to the continued revival of the province's tourism sector. In this regard, itinerary planners and POI recommendation systems are such of the many utilities that can improve this.

Itinerary planning is a process where someone thoughtfully organizes a set of destinations into a detailed schedule in order to maximize their time while taking into account specific constraints that can affect their experience. Nowadays, creating itineraries has become increasingly automated through recommendation systems, which can even generate schedules based on these constraints (Jewpanya et al., 2025; Liu et al., 2024). Some of the modern-day recommender systems are often a mix of both optimization algorithms and content selection processes. This method resolves not only the scheduling aspect of itinerary recommendation but also the relevance of the destination suggested to users. However, such itinerary recommendation systems are limited to specific regions, often bound by the capabilities of the model or lack of data that can be used to identify which destinations are to be included. (Cui et al., 2025; Papadakis et al., 2024; Yulfihani & Zakariyah, 2024). The development of these itinerary recommendation systems are driven by the need to simplify the complicated problems of traditional and manual itinerary planning. Although there are many systems that are already developed to cater to this problem, a common weakness they have lies in the overcomplexity of their systems (Postnikova, 2024). These weaknesses expose the need for a simple, localized itinerary recommendation system, particularly in areas with uneven destination popularity like Bulacan, where tourism potential remains underdeveloped despite its rich cultural and historical offerings.

Planning a travel itinerary manually is a demanding task, as many tourists must differentiate attractions to fit their interest while at the same time meeting limitations in terms of time, budget, and location accessibility. The process becomes even more complex if visits last for multiple days, requiring careful distribution of destinations across schedules while considering opening hours and travel durations. (Hendrawan et al., 2024) state that an

increase in points of interest (POIs) in combination with limited resources makes it difficult to create itineraries, and while travel agents offer assistance, such services are high cost and inaccessible to many tourists. Additionally, it is often difficult to split a one-day plan into days without computational support and still obtain optimal plans that meet travelers' expectations. (Porras et al., 2022) also argued that planning itineraries is fundamentally difficult, for it not only involves choosing POIs themselves but also finding an optimal visiting order under numerous constraints, such as personal interests, transportation, and time constraints. These problems demonstrate that classic ways of planning itineraries tend to lead to incomplete or unsatisfactory schedules, which there is value in creating automated systems to plan itineraries more efficiently. From a computational perspective, this problem is closely related to the model of Traveling Salesman Problem (TSP), which is known to be NP-hard, meaning solutions become exponentially more complex as the number of destinations or POIs increases (Wu & Fu, 2020). At the same time, localized recommender systems such as the Batang Regency highlight the difficulty of delivering meaningful personalization when only content-based similarity measures are applied (Yulfihani & Zakariyah, 2024). And even when functional apps are deployed, itinerary generation has to carefully consider constraints within user satisfaction metrics, which remains a significant task despite advanced recommendation and optimization methods (Papadakis et al., 2024; Yulfihani & Zakariyah, 2024). These limitations point to the need for a practical, user-centered, and localized solution.

With this, a proposed itinerary recommendation system, LAKAD, aims to navigate these problems and offer a tourist utility app for exploring destinations in the province of Bulacan. The system will be developed to feature core utilities that can enhance travel experience of tourists, among these features is an itinerary optimization where the system ensures that travel routes are arranged in the most efficient way possible, minimizing time and cost while still maximizing convenience. The system also aims to provide a personalized itinerary generation for users to tailor travel plans according to their own

preferences. Additionally, a tourist spot searching function will be implemented to allow users to freely and easily browse Bulacan's offered attractions and destinations, this include heritage sites to natural sceneries. An itinerary navigation feature will help users arrange their trip destinations into a structured schedule according to their desired length of the travel, in addition to features that can guide tourists during their trip like providing directions and other similar functions. And to help users stay organized, an itinerary management feature will let users arrange and keep track of their chosen destinations.

Statement of the Problem

The lack of systems and applications for itinerary generation in Bulacan makes it much harder for tourists to traverse the wonders the province has to offer. As such, the main objective of this study is to develop a mobile personalized itinerary generator for promoting tourist locations in Bulacan as well as providing optimized paths in the itinerary, allowing the tourist to further enjoy their trip. Specifically, this study aims to answer the following questions:

1. In what ways can the system contribute to promoting tourism in Bulacan?

2. What tourist spots/locations can the system recommend to tourists?

3. How can the proposed system be developed with the following functionalities:

    3.1. Itinerary Optimization

    3.2. Personalized Itinerary Generation

    3.3. Tourist Spot Searching

    3.4. Itinerary Navigation

    3.5. Itinerary Management?

4. How acceptable is the proposed system based on the criteria defined in the Technology Acceptance Model?

    4.1. Perceived usefulness,

    4.2. Perceived ease of use,

    4.3. Attitude towards using, and

4.4. Behavioral intention?

5. How well does the proposed system meet the ISO / EIC 25010 requirements?

    5.1. Functional Suitability,

    5.2. Performance Efficiency,

    5.3. Compatibility,

    5.4. Interaction Capability,

    5.5. Reliability,

    5.6. Security,

    5.7. Maintainability, and

    5.8. Flexibility?

Significance of the Study

This study developed an optimized mobile itinerary planner designed to promote tourism in Bulacan as a destination for tourists while providing functional navigation support for locals and commuters. With the integration of personalization and efficiency, the system serves as a tool that highlights the province's attractions, supports its tourism industry, and makes it convenient to organize trips.

Tourists and travelers. The system offers personalized and optimized itineraries based on their interest and time availability. This way, it ensures that their time is maximally optimized as they enjoy major destinations alongside lesser-known examples of Bulacan's cultural, historical, and natural heritage.

Business owners and local establishments. The system offers opportunities for greater exposure, as their products and attractions may be featured in itineraries. This kind of promotion leads to greater customer engagement and supports the growth of local enterprises.

Local tourism sector, government units, and communities. The system provides a modern tool to promote sustainable tourism. Through the distribution of visitors across various attractions and offering organized travel options, it helps in stimulating

local economies, sustaining community livelihoods, and improving Bulacan's reputation as a prominent travel destination.

Commuters and local residents. It functions as a navigation tool with optimized routes across Bulacan. Apart from addressing tourism, it gives daily convenience for people who need assistance in moving around the province.

Overall, this study is significant because it supports tourism advancement, sustainable development, and culture enhancement in Bulacan, and presents an example of how optimized and technology-driven solutions may enhance travel and navigation experiences.

Scope and Limitation of the Study

This study focuses on the development of a mobile personalized itinerary generator designed specifically for the province of Bulacan. The system aims to enhance the travel experience of tourists by providing functionalities such as itinerary optimization, personalized itinerary generation, tourist spot searching, itinerary navigation, and itinerary management. By integrating these features, the system seeks to make traveling within Bulacan more convenient, efficient, and engaging for visitors.

The scope of this study is limited to historical, cultural, and heritage tourist destinations within Bulacan. These locations will be requested and validated by the Provincial History, Arts, Culture, and Tourism Office (PHACTO) to ensure accuracy. Tourist destinations outside Bulacan are not included in the recommendations. Route generation and recommendations will be based on weights assigned to each vertex or Point of Interest (POI), which serve as inputs for the optimization process. Data for mapping and location will be sourced from platforms such as Mapbox, OpenStreetMap, and other publicly available datasets.

For route optimization, the system will employ the African Buffalo Optimization (ABO) algorithm, applied within the framework of the Traveling Salesman Problem (TSP). The weighted POIs will allow the system to recommend not only efficient travel paths but

also prioritize destinations according to their relative importance or value. This ensures that the itineraries generated are both optimized and meaningful to the user's preferences.

The system will not include additional services such as accommodation booking, ticket reservations, or guided tour arrangements. Personalization of itineraries will be limited to individual users and not group travel. The mobile application will be developed exclusively for the Android operating system due to feasibility and cost considerations, as development for iOS or other platforms falls outside the project's scope. Furthermore, the study will be carried out within a development timeline of approximately seven months, which restricts the number of features and the extent of testing that can be conducted.

Evaluation of the system will be conducted in two ways: validation of tourist destinations by PHACTO and feedback from tourists based on the Technology Acceptance Model (TAM), focusing on perceived usefulness, perceived ease of use, attitude toward using, and behavioral intention. In addition, the system will be assessed against the ISO/IEC 25010 software quality standards, covering functional suitability, performance efficiency, compatibility, interaction capability, reliability, security, maintainability, and flexibility.

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