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Chatbot AI Riau tourism towards society 5.0 success

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ABSTRACT

Riau Province stands out as one of the most rapidly developing regions in Indonesia, showcasing significant advancements economy, population, and tourism. The strategic positioning of Riau Province along the world's busiest routes, establishes this province as a focal point for diverse activities from multiple nations. Furthermore, the natural resources of Riau Province provide it as a significant business hub by substantial activities. This undoubtedly impacts the cross section both business and tourist visitors from local and international. Unfortunately, it is found that information pertaining to Riau tourism is under-addressed the visitors' need. Therefore, the chatbot artificial intelligent (AI) is developed to deliver comprehensive information about tourism in Riau, encompassing tourist attractions, culinary, and merchandise destinations. This chatbot is adopted a prototyping approach for software development with natural language processing, employing tools such as Xampp, Visual Studio Code, PHP for programming language, and the Botman for the library. This chatbot is then integrated with a customized website platform utilizing an accessible API. The questions are derived from commonly asked questions on the tourism platform, limited into five tourist attractions, culinary options, or merchandise's spot. To evaluate, a black-box and user acceptance testing techniques will be employed to verify that the application operates as intended and receives favorable feedback from users. This chatbot grows into the smart and responsive tool tailored to tourism needs in Riau. This tool supports the Society 5.0 that concerns on human centric, technology, and resilience social and community while preserving the cultural elements of Riau's Malay heritage.

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1. INTRODUCTION

The transition of technology evolution from 4.0 to 5.0 carries significant implications for changes in individuals' lives within society. This revolution is defined by the significance of effective collaboration between human-centric and technological elements. Digital transformation 4.0 teaches society that technology alone is insufficient to achieve optimal satisfaction and success [1, 2]. The significance of human or community factors is paramount in achieving success in digital transformation [3]. This indicates that technology serves merely as a supplementary tool in the pursuit of efficiency and effectiveness. Humans continue to be the primary force behind the advancement of technology optimization. Consequently, resilience is essential not only in the creation, development, and utilization of technology to enhance the success of digital transformation, but also in the social aspect of society, particularly among the younger generation in effectively utilizing technology [4]. This condition fosters the development of a resilient and industrious society 5.0, characterized by perseverance, critical problem-solving abilities, and a readiness to confront challenges and issues

arising from technological and societal transformations [5]. Therefore, the development of a prototype for the Riau tourism chatbot AI is a significant step towards achieving success in society 5.0.

Riau Province is recognized as one of the most rapidly developing regions in Indonesia, demonstrating notable progress in its economy, population growth, and tourism sector. The strategic location of Riau Province along the world's busiest shipping routes positions it as a central hub for various activities involving multiple nations, including Malaysia, Singapore, Thailand, Vietnam, and the South China Sea. Moreover, the natural resources of Riau Province, particularly oil, natural gas, rubber, palm oil, and forested lowland, position Riau as a prominent business hub for considerable activities [6, 7]. This certainly affects the demographic of both business and tourist visitors, both locally and internationally. Riau province, recognized as the homeland of the Malay, firmly supports Malay culture in its social practices [8]. The city government of Pekanbaru, Riau is actively working to enhance the presence of Malay culture by promoting culture-based tourism. This includes the developing tourist attractions, showcasing a variety of Malay culinary specialties, and offering merchandise that reflects the unique aspects of Malay culture in Riau [9]. Several potential tourist attractions in Riau Province include Muara Takus Temple, Siak Sri Indrapura Palace, and natural sites such as Lubuk Bigau Waterfall, Jemur Island, Green River, and Kampar River, along with the Teluk Jering Tambang recreational park. In the meantime, a range of Malay culinary specialties has been developed, including sagu, such as Sagu Noodles, Bolu Kemojo, Tarempa Noodles, Patin fish crackers, laksa kuah, salai fish, and ketan talam durian. Besides, Riau is also renowned for its merchandise, including songket melayu riau, tanjak songket sarong, Lancang Kuning brooch, batik bono, and traditional Malay clothing, commonly referred to as baju kurung [10].

The Riau government provides robust support for tourism development through the implementation of various Regional Regulations, such as Regional Regulation No. 2 of 2018 outlines the Regional Tourism Development Master Plan (RIPPDA) for Riau Province from 2018 to 2025, which establishes strategies and policies for tourism development that leverage local potential. Moreover, Regional Regulation No. 4/2018 on the Implementation of Tourism which regulates the role of local governments, business actors, and communities in supporting the tourism industry. The Governor Regulation No. 18/2020 focuses on the promotion of community-based tourism villages. Besides, the Riau Provincial Government allocates a budget for the development of tourism infrastructure, including roads to tourist attractions, public facilities, and tourism promotion. The Riau Provincial Government engages in numerous partnerships and promotional activities in collaboration with businesses and communities. These initiatives include several events such as the Riau Malay Cultural Festival, Tour de Siak, which promotes sports and tourism, and the International Bono Surfing Promotion [11] and [12]. Unfortunately, it has been observed that information related to Riau tourism does not adequately address the needs of visitors. Several problems related to Riau tourism were found, among which the most significant is the promotion that has not been optimized both in terms of promoted tourism content, supporting technology such as through websites, videos, brochures, social media, Instagram, Facebook, and Twitter, TikTok, and integrated management of tourism promotion management both from the government, tourist agents, SMEs, and other stakeholders [11] and [13]. Therefore, the artificial intelligence (AI) Chatbot has been developed in this research to provide detailed information regarding tourism in Riau, including tourist attractions, culinary options, and merchandise destinations.

This AI chatbot technology was selected as a tool for promoting tourism, given its extensive use in delivering interactive communication services to the public. Chatbot technology has been extensively adopted by hotels, travel agencies, and airline companies to promote various tourist activities and offers [14]. A chatbot is defined as a computer program that exhibits a capacity to converse quite naturally with users in a way that resembles a human dialogue with the adoption of AI and natural language processing techniques to assist tourists before, during, and after visits. They are advancing to encompass additional functionalities, improving interactions in intelligent tourist destinations [15]. Also found that NLP can effectively applied for tourism issues. However, new developments and paradigms of NLP may provide further improvements in this industry, opening up new challenges that should be addressed in future research [16]. Some of the main challenges related to these technological advances including deep learning, big data, machine learning through the development of chat GPT, chatbot, IoT, and etc. Stated that NLP can increase the hospitality and tourism sector through the smart travel guide development [17].

The advantages of chatbots in the tourism sector encompass destination guides, trip planners, booking services, real-time assistance, local insights, event information, multi-language support, and interactive maps. Previous researchers who have successfully implemented chatbots include [18] who developed a chatbot recommender for managing travel and tourism. This system facilitates textual communication to assist with hotel bookings, trip planning, and recommendations for noteworthy sights, utilizing model-based reasoning to enhance user interaction [18]. Presented an intelligent chatbot designed to enhance tourism experiences in Saudi Arabia [19]. This chatbot provides timely and accurate responses, addressing tourists' inquiries to assist travelers [19]. The above research indicates that utilizing a chatbot for tourism promotion is highly effective and offers users significant convenience in accessing tourist information. In this study, we developed a straightforward chatbot AI application designed to deliver tourist information to both the residents of Riau, domestic and international visitors to the Riau region.

2. RESEARCH METHODS

This chatbot employs a Prototype methodology for software development with AI and natural language processing (NLP), incorporating tools such as Xampp, Visual Studio Code, PHP as the programming language, and Botman as the library. A Prototyping system in chatbot development provide substantial advantages that improve the entire user experience. Prototyping approach enables developers to enhance conversational flow through an iterative design process informed by actual user feedback, resulting in more effective and engaging interactions. Prototyping systems can leverage audience input to obtain varied viewpoints on conversation flow, resulting in actionable suggestions for enhancement [20]. The chatbot is coupled with a tailored website platform through the utilization of available APIs. APIs play a vital part in chatbot development by enabling easy connectivity with several platforms and augmenting the chatbot's functionality. APIs enable chatbots to access vast knowledge repositories, engage with consumers on widely-used messaging platforms, and improve user experience via tailored conversations. These integrations enable chatbots to do intricate jobs effectively, rendering them a useful asset across various disciplines [21]. Herein, the APIs of tourism spot websites based on the categories provided by the chatbot AI. The inquiries originate from frequently posed questions on tourism platforms, focusing on two tourist attractions from each three regions in Riau Province, including Pekanbaru, Siak, and Kampar. The categorized segments into tourist attractions, culinary options, and merchandise locations. This prototype chatbot AI is limited for five data repositories for each category’s segments. The system analysis and design will be presented through the development of architectural design and a use case diagram. Black-box testing and user acceptance testing methodologies will be employed to ascertain that the application functions as planned and garners positive feedback from users. Black-box testing and user acceptance techniques are crucial in software development testing, as they verify that the system fulfills user needs and operates appropriately without necessitating comprehension of its internal mechanisms. Black box testing evaluates software functioning through inputs and outputs, whereas user acceptability testing (UAT) determines if the software fulfills end-user requirements. Collectively, these techniques enhance software stability and user satisfaction [22].

3. RESULTS AND DISCUSSIONS

3.1. Architecture Design

The architectural concept for this chatbot AI application is illustrated in Figure 1. The prototype chatbot AI was implemented in the construction of a web-based system. This platform allows users to explore and discuss Riau tourism interactively. Information was provided on three places to restrict the knowledge and repository of the chatbot AI, including Pekanbaru, Siak, and Kampar. The users inquire about tourism, culinary, and merchandise locations in each destination. This document discusses how NLP and APIs from tourism websites connect to deliver relevant responses according to user needs. Subsequently, five tourism websites for each destination are presented.

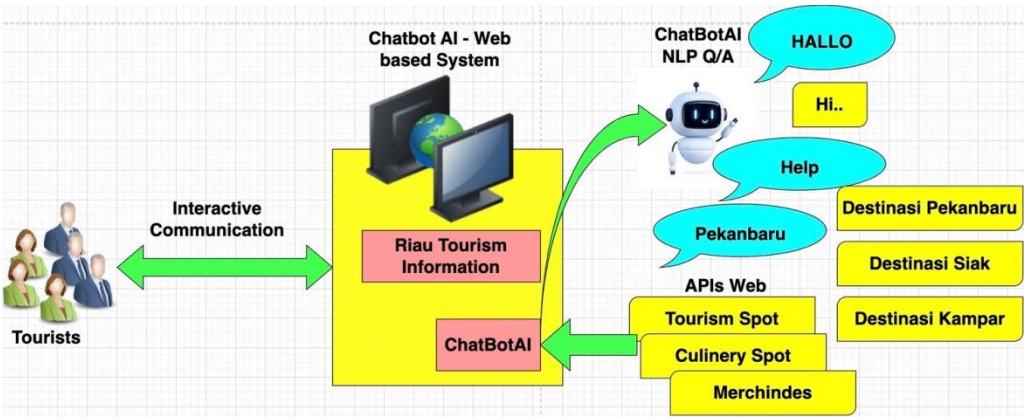

Figure 1. Architecture design for chatbot AI for Riau tourism.

3.2. System Development

The chatbot AI system was developed by adopting the object-oriented method. Thus, the use case diagram of this chatbot AI can be seen in Figure 2.

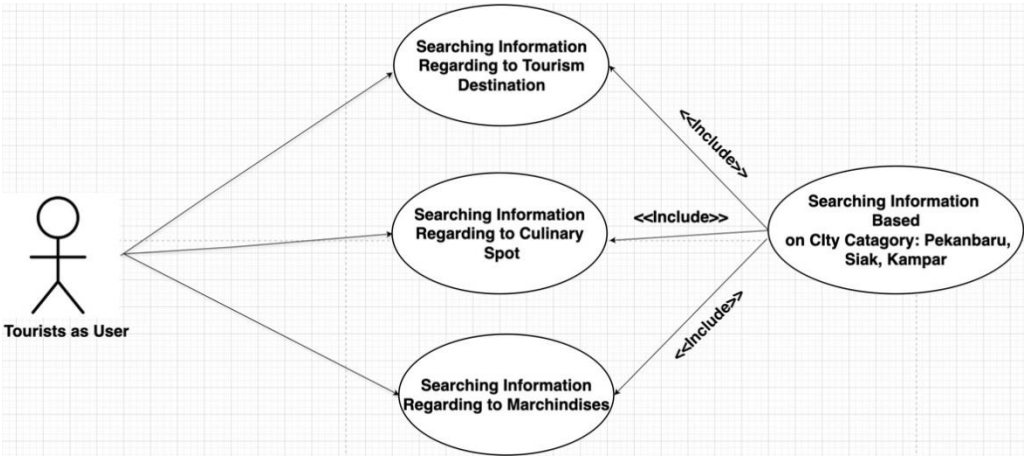

Figure 2. Use case diagram.

The design of system interfaces can be seen in Figure 3. The example of Source Codes system can be seen in Figure 4.

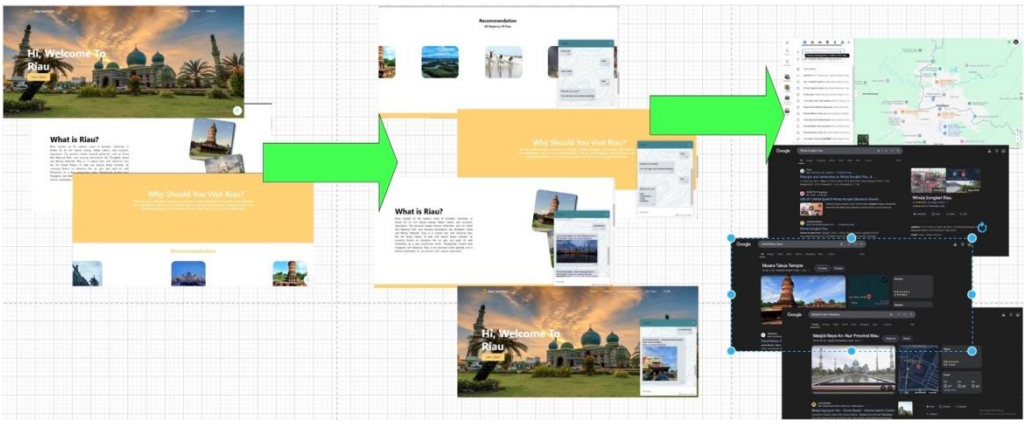

Figure 3. Chatbot AI Riau tourism interfaces system.

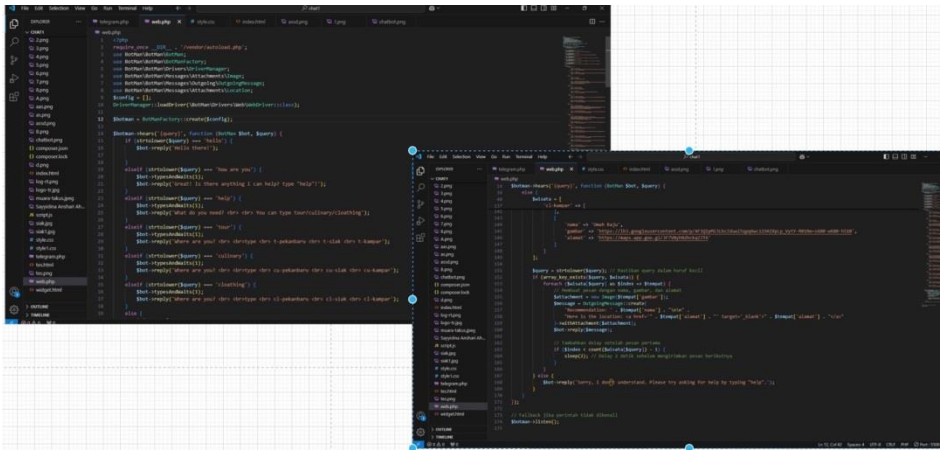

Figure 4. The sources code system.

3.3. Blackbox Testing Result

The black box testing indicates that the entire functionality of chatbot AI web based has been running well as properly. The websites inform about the tourism in Riau Province and several information regarding on the interesting places that shows the Riau as Homeland of Malay. Then the chatbot AI with simple natural language processing which tracking commonly questions and answers based on the category city including Pekanbaru, Siak, and Kampar, and category based on the tourism destination, culinary spot, and merchandise's location.

3.4. UAT Result

UAT is developed based on the dissemination of closed ended questionnaire with 5 questions asking about the respondent's agreement on the functionality, usability, interfaces design, and performance of the chatbot Riau Tourism application. As the result, 90% of respondents from total 5 respondents are agreeing that this chatbot AI application is functional properly, good interfaces design (coloring, text size, and lay out), and useful in aiding the tourism to find information regarding on the proposed categories. In nutshell, this chatbot AI has been successfully provides the Riau tourism information promotion for society 5.0 success.

3.5. Discussion

The findings of this study indicate that the potential for establishing an AI chatbot to enhance tourism in Riau Province is substantial. The information constraints that were previously addressed manually with limited resources can be enhanced through the construction and maintenance of the AI tourism chatbot Application. Despite these results being in the prototyping phase, further development can enhance the applicability of this AI chatbot in assisting the government, community, and other stakeholders in advancing Riau's economy and enhancing community services. Affirm that developers of AI-driven chatbot technology must guarantee that chatbots are readily available, possess a user-friendly interface, exhibit greater human-like qualities and engage with clients in various local languages [23]. Furthermore, comprehending the precursors of chatbot acceptance among users is a significant consideration for practitioners, managers, and executives within the tourism sector. Also discovered that chatbot AI enhances emotional efficacy in tourism via anthropomorphic theory (initial trust, perceived delight) during travel [24]. Discovered the robust AI capabilities to generate more intelligent and human-like innovations aimed at enhancing consumer satisfaction. This pertains to the evolution of civilization 5.0 as a novel human-centric civilization characterized by globalization and the rapid proliferation of digital technologies [25].

4. CONCLUSION

A prototype of the chatbot AI for Riau Tourism has been successfully constructed and thoroughly evaluated utilizing black box and user acceptance testing (UAT) assessments, contributing to the success of Society 5.0. This chatbot AI serves as a guidance tool for visitors to Riau, providing information about appealing tourist spots, gastronomic venues, and locations for purchasing

mementos. This prototype solution can assist stakeholders, including the government, travel agents, SMEs, and communities, in advancing technologically enhanced tourism in Riau. Consequently, the growth of Riau tourism will directly influence government revenue and the economy of Riau, contributing to the success of Society 5.0. This chatbot AI can be enhanced by augmenting its knowledge base and resources sourced from the global web. Furthermore, the adoption of NLP in English or Malay will enhance the system's interactive utility and user-friendliness. Consequently, the number of users in the vigorous Riau society will expand.

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