

# Artificial Intelligence in The Tourism Industry: Current Trends and Future Outlook

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**Abstract**—This article emphasizes the importance of artificial intelligence in the tourism sector. Various technologies are being integrated to enhance customer services. The world is making significant efforts to strengthen industrial competitiveness using big data and artificial intelligence technologies, and tourism is facing increasing demands for new strategic solutions through the digital transformation of the existing tourism industry using cutting-edge technologies. Artificial intelligence quickly addresses customer requirements by providing timely information on critical factors such as hotels, airplanes, cathedrals, general facilities, and natural resources. This information can include interactive messages, virtual tours, interactive booking processes, language translations, and global positioning system technology. Artificial intelligence algorithms in the tourism industry help predict demand, revenue, and business trends. The tourism industry incorporates new technologies like virtual reality, chatbots, and language translation. Adopting artificial intelligence apps requires significant investments, including initial capital costs, maintenance, software updates, and staff training. Understanding the tourism and artificial intelligence industry will help build an artificial intelligence that will significantly transform the tourism industry in the future. The rise of artificial intelligence simplifies the process of making travel plans. Tourists used to decide their destinations and activities using pictures in a catalog or on the Internet. They have recently begun using artificial intelligence to find and tailor their specific requirements. Artificial intelligence is a valuable supplementary aspect to the future of the tourism industry. However, it cannot surpass the human touch, an essential determinant of experiential tourism.

**Keywords**— Artificial intelligence; tourism industry; maximum likelihood algorithm; chat-bot; virtual reality; language translator.

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## I. INTRODUCTION

Artificial intelligence (AI) systems are defined as software or hardware systems given complex goals by perceiving their environment through data acquisition, interpreting knowledge, or processing information. AI is derived from existing data and deciding the best action to achieve the given goal. AI has been used in the manufacturing, finance, healthcare, and tourism industries. The footprint of AI is rapidly expanding to various industries across the globe. AI could positively reshape the tourism industry. It has penetrated the tourism and hospitality industry and is utilized to achieve a competitive edge in the ever-changing market [1].

AI quickly addresses customer requirements by providing timely information on critical factors such as hotels, airplanes, churches, general facilities, and natural resources. This information can include interactive messages, virtual tours,

interactive booking processes, language translations, global positioning system (GPS) technology, and sales management.

The tourism industry has many areas with greater scope for applying AI to improve services. AI technology can turn the complete hotel room into an attractive tourist destination. Upon arrival in their hotel room, customers can convert the room into a virtual 3D environment mirroring their desired destination, allowing them to enjoy a 3D view of the location within the room. Robots in hotels can assist guests by guiding them to their rooms, transporting their luggage, providing meals, and managing housekeeping tasks. A few hotels are currently utilizing this technology.

The article emphasizes AI's significant role in the tourism and hospitality sectors. The integration of various technologies is improving customer services. The global industry is constantly attempting to increase industrial competitiveness through big data and AI technology, and the tourism and hospitality industry is under growing pressure to discover creative solutions.

## II. MATERIALS AND METHOD

### A. Tourism Industry

Tourism is a social, cultural, and economic phenomenon that entails the movement of people to countries or places outside their usual environment for personal or business purposes. The tourism industry includes all companies that serve the requirements of travelers. Travel agents provide customers transportation, hotel, hiking, fishing, other leisure activities, and related arrangements. The hospitality industry refers to businesses that provide lodging or accommodation, as well as food service, for people who are away from home. Although organizations that provide food and lodging constitute representatives of the hospitality business, conferences and meetings may also be considered part of the hospitality business [2].

The tourism industry is a large part of the global economy and has a positive or negative correlation with the global economic environment. In many nations, tourism significantly influences employment and GDP. Additionally, tourism may aid in developing less developed and rural areas [3]. Tourists used to decide their destinations and activities using pictures in a catalog or on the Internet [4]. Recently, they have begun using AI to find and tailor their specific requirements. Regional variations exist in using AI in the hotel and tourism industry. Chatbots, virtual reality, and search engines rank highly for their use of AI in prospective adoption [5].

From the consumer perspective, AI helps travelers improve decision-making, find more information, suggest appropriate mobility, and provide a better experience. Personalization technology provides customized information based on customers' preferences and travel experiences. From a business perspective, AI can be used in all management aspects. Adopting AI in the tourism industry through various AI applications helps achieve significant growth [6].

### B. Evolution of Artificial Intelligence

The development of machine-learning algorithms and AI's power are all contributing to its growing significance. Many difficult jobs that would demand intelligent effort if performed by humans depend on massive data, processing power, and algorithms [7]. AI is the most important and interesting technology of recent decades because of its widespread application in almost all fields of science and engineering. Advancements in this area have triggered the curiosity of many engineers and researchers worldwide. Most companies are exploring their capabilities across multiple areas [8].

Google Travel and TripAdvisor discovered that most customers plan their online trips. Sustainable tourism requires gathering and evaluating TripAdvisor reviews from international travelers [9]. Smartphones are used for trip planning, and smartphone applications are positively associated with travel outcomes. Millennials are more likely to use smartphones to make travel decisions [10].

Several new technologies have emerged in the AI domain and have helped deliver a good experience and efficient solutions to the tourism industry. These technologies include virtual reality, chat-bot, Google Maps, language translators, and maximum likely algorithms. There has been an increasing

trend in AI research relating to the hospitality and tourism industry since 1991, with a notable increase in publications and citations since 2018 [11].

### C. Generative Artificial Intelligence

Generative artificial intelligence (AI) is a new form of AI that can create new content by extrapolating from its training data. According to user requests, it can generate various types of content, including text, image, video, audio, and software code. It relies on machine learning models called deep learning models [12]. This technology was introduced into chatbots in 1969. ChatGPT, a chat-bot-based neural network model, was released in November 2022 and currently has approximately 180 million users.

ChatGPT uses natural language processing to create human-like conversations. Businesses in the tourism industry often have a global clientele. Because of their disparate linguistic backgrounds, many clients may struggle to communicate with them. Because ChatGPT can freely converse in a wide range of commonly spoken languages, it can be quite helpful in this situation. The adoption of ChatGPT is expected to bring significant changes to the hotel and tourism industry. There are several ways in which ChatGPT can save companies' expenses. By addressing numerous frequent questions and problems, it can reduce the effort of a customer service team. This frees up service agents to concentrate on handling more delicate or complex inquiries that call for human interaction [13].

ChatGPT can help tourists make decisions related to itineraries, transportation, hotels, and price comparisons. It is capable of creating bookings due to its advanced functionality. To inquire about costs and availability, a tourist can initiate a discussion and make a reservation within that chat. Users can check the specifics of their reservations, make changes to them, or cancel them via the ChatGPT interface. ChatGPT can advise users about local weather, recommend other routes if travel is delayed, and offer crucial information like visa requirements. Generative artificial intelligence technologies have advantages in superintelligence, hyperproductivity, and superpersonality [14].

### D. Artificial Intelligence in Tourism

1) *Virtual reality*: Virtual reality (VR) technology typically uses a VR headset to generate an artificial environment. This artificial setting offers a VR experience. Customers using VR technology largely experience the environment digitally. Due to COVID-19 restrictions on tourism, virtual travel experiences have become widespread. Communicating tourism products to potential customers in a clear and attractive format is essential. In particular, virtual reality's increased interactivity, immersion, and visualization have played a key role in communicating tourism's intangible and experiential nature as a product [15].

Hotels demonstrate their facilities using 3D videos. During the virtual hotel tour, customers get to know the hotel room, amenities, fitness club, and restaurants before they arrive at the hotel. Customers want to experience traveling and explore the tourist spots before they move to the tourist spots. Recently, this technology has been widely used in the tourism and hospitality industry [16].

Customers usually need to gain more knowledge about the tourist attractions or the overall tourism experience in a specific destination before they go there. They want to explore and experience the destination before they go there. They usually do this by searching relevant information online through customer reviews. There may be a gap between customer expectations of the service and the actual service.

VR technology has been developed and studied extensively for destination marketing. However, if properly implemented, it can help reduce the concentration of visitors to tourist attractions or the negative aspects associated with frequent travel. It can also be applied to tourism in destinations that are too remote, expensive, inconvenient, unsafe, or vulnerable to visitors [17].

2) *Chatbots*: Chatbots are computer programs commonly designed to respond to basic inquiries from customers. They come equipped with algorithms that recognize specific keywords in queries, prompting automated responses [18]. There are two types of chatbots: text-based and voice-based.

Customers can access chatbots at any time by simply installing the application on their smartphone. Hotels have social media or application chatbots. Customers need information about the hotel facilities and services. Chatbots offer a wide range of services to customers, such as food ordering, housekeeping service, check-in and check-out times, taxi services, and information about nearby facilities [19].

Generative pre-trained transformer (GPT), a more advanced version of the typical chatbot, is expected to receive more attention and use as it can respond to clients' requests thoroughly and consistently. Through natural language processing, GPT produces complex and reliable answers to inquiries in various languages, facilitating more accurate and natural interactions between tourists and chatbots. It is anticipated that GPT will be used much more frequently in the upcoming years to create and provide service experiences. These chatbots can respond to customer inquiries in a way that sounds natural and human, as well as offer personalized guidance to enhance their overall experience [20].

Technological improvements in GPT can replace employees in traditional hospitality and tourism businesses. For example, GPT can replace jobs such as tour guides, customer service representatives, and concierges, thus reducing the number and level of human involvement in the process of creating and delivering service experiences. The development and operation of GPT require significant investment, especially in managing large-scale data centers, high-performance computers, and skilled personnel. In addition to the initial investment, ongoing maintenance costs also occur. Therefore, small and medium-sized enterprises should make careful management decisions about introducing GPT, which will require much money [13].

3) *GPS technology*: The GPS is a satellite-based navigation system that allows for accurate location determination anywhere on the earth. It operates through a satellite network that transmits signals to GPS receivers, providing precise positioning, navigation, and time information. Initially developed for military purposes, GPS technology eventually became available for civilian use and had a revolutionary impact on navigation and location services around the world. The transportation industry has

significantly transformed with the widespread adoption of GPS technology. Satellite navigation systems allow users to monitor the movement of objects and provide real-time location information on request [21].

Google Maps and TripAdvisor assist travelers by keeping them informed about directions. The apps provide details about nearby accommodations, restaurants, and theme parks. They leverage GPS technology to provide location-based services, enhancing travel planning and exploration convenience. These apps serve as comprehensive travel guides, offering users real-time information on attractions, navigation, local events, and dining options. Moreover, these applications allow personalized recommendations based on user preferences and behavior [22]. The widespread use of smartphones with GPS has facilitated information collection on tourist routes and times at destinations. GPS data is used in research to understand complicated tourist behavior better, which informs the development of destinations and transportation infrastructure [23].

4) *Language Translator*: The hospitality and tourism industry is one of the world's largest and most competitive industries. It relies heavily on communication, and language barriers can significantly hinder its success. Translation services are essential in ensuring effective communication in the tourism industry. The services help tourism destinations communicate with customers in their native language [24].

The stunning scenery and well-known hospitality of the area attract foreign tourists. Still, the implications and consequences would be lessened due to the lack of a universal language. Language barriers make it difficult for tourists to visit some destinations and explore the local culture. Many applications translate one language to another. These applications benefit travelers who visit foreign locations where they may encounter unfamiliar languages [25].

Accuracy is essential in language translation. Traveling abroad raises the possibility of service encounters between clients and providers of other nationalities, who frequently struggle with cross-cultural communication and speak different languages. The influence of cultural differences across nations on online reviews differs for various countries and locations; however, using a common language is always positively correlated with the value of online reviews, no matter which nation the service provider is based in [26]. Language translators would help the tourists to communicate with the residents in their local language. Any errors or misunderstandings can result in negative reviews and affect the business's reputation. It is essential to work with a professional translator who has experience in the tourism industry and understands the nuances of the language [27].

5) *Maximum Likelihood Algorithm*: The tourism and hospitality industry has abundant data from its business. AI algorithms have been applied to forecasting hotel tourism, transportation, satisfaction, and revenue management. Personalized AI modeling based on previous travel data can help develop smart tourism and hotel services [28]. Service providers can optimize their services by using AI in combination with the maximum likelihood algorithm (MLA) [29]. The MLA utilizes historical data to calculate the likelihood values of prices. This algorithm suggests the timings at which prices rise or drop.

This optimization algorithm service provides information on the optimum prices of tourism sites, including accommodation, restaurants, clubs, theme parks, casinos, and shopping malls, thus offering customers the best available options. A study was also carried out using MLA on the relationship between a nation's economic factors and foreign visitor flows. It was discovered that the variables influencing tourist flows are the GDP, imports, exports, and purchasing power parity of the countries of origin and destination [30].

#### *E. Current Trend of Artificial Intelligence in Tourism*

1) *Virtual reality*: VR technologies are a perfect gateway to explore unseen locations beforehand. The use of VR and augmented reality (AR) as marketing communication channels in the tourist and hospitality industries is gaining ground as a way to revolutionize and improve the client experience. Because the world is changing so quickly, the hospitality business must constantly offer something new in its promotional tools compared to traditional visual advertisements. By combining VR and AR, the hospitality and tourism sectors will be able to offer their customers a realistic, beneficial, and memorable experience. This is because the improved mobile capabilities will allow consumers or tourists to access information in the context that best suits them [31].

Hotel reservations are one of the main applications. Through the virtual experience, customers can obtain comprehensive information to make hotel selection decisions. The way customers engage with hotel service providers has been completely transformed by the revolutionary technologies known as VR and AR. The freshness and usefulness of these technologies positively impact customers' satisfaction, which encourages their adoption of hotel reservations. This demonstrates how VR and AR have huge opportunities to improve customer experience and encourage repeat bookings.

It is recommended that hotels and marketers use these data to adjust their strategies to match tourists' evolving expectations and stay up to date with technological advancements. Recently, hotels have collaborated with marketers to provide clients with virtual experiences. Marketers provide customers with a virtual journey to a place by collaborating with tourism spots [32]. Marriott introduced several VR-based innovations as part of a wide movement to revolutionize how their guests experience traveling. Customers could order the VR service directly to their rooms via a mobile app. The guests would then use a VR headset, headphones, and comprehensible instructions to explore. The immersive and innovative nature of VR allows hoteliers to leverage the technology. Many companies have started using VR technology to promote destination experiences. These technologies provide information on all of these factors and provide a direct customer experience, which motivates customers to travel and experience the services.

2) *Chat-bots*: Chat-bots can transform how hotels interact with guests and conduct their businesses by acting as virtual concierge assistants. Users can book rooms directly through the chat interface by integrating with the reservation system. Direct reservations are the most lucrative for hotels. Every hotel wants to give their guests a great experience.

Inevitably, the guests will need some information about the hotel facilities. This is where the chat-bots come into play.

A chat-bot has several advantages, including more direct bookings, cheaper customer support costs, simpler client review management, and multilingual global service. The InterContinental Hotel AI chatbot helps guests by answering questions, making reservations, and providing information about the property. As a result, customer satisfaction has increased, and the workload of human staff has decreased. Since its debut in 2016, the Hilton Hotel AI chatbot has processed over 10 million conversations, reduced the standard customer service waiting times by 30 percent, and is accessible in more than 20 languages.

The Marriott Hotel AI chatbot has helped increase guest engagement and satisfaction. Whether your guests want to book a room or need specifics about their travel schedule, the chatbot can interact with hundreds of customers simultaneously in real-time without delay. While a hotel chatbot can't take the position of your customer service team, it can manage regular questions and free up staff members.

Personalization is a key component that marketers should integrate with their services. Chatbots can even store guests' previous data, which allows them to make recommendations based on records. Hotels are increasingly using AI to customize the experience for guests from check-in to check-out. Utilizing IBM Watson's artificial intelligence, Hilton's Connie is a concierge offering recommendations for restaurants, hotel amenities, and nearby attractions [33]. These voice-based chatbots are meant to improve hospitality, further improving customer engagement and experience. Delivering a great guest experience is possible with hospitality chatbots.

3) *GPS technology*: The GPS system provides the most effective or optimized paths to the destination. Precise travel time forecasting helps with pre-trip preparation and developing traffic management strategies that reduce travel times and mitigate traffic congestion. This can provide safe travel, reduce unnecessary fuel expenses, and improve customer satisfaction. A GPS tracking device keeps track of all trips, allowing users to select the most effective path while avoiding routes with many obstacles [34].

Smartphone applications that use GPS can make excellent-quality recordings of people's movements in place and time. Travel behaviors reflect how individuals organize their daily activities in various environments. The emergence of smartphone applications for transport research has provided opportunities for accessing an enormous quantity of data on tourist behavior that was previously unavailable [35].

The visual positioning system (VPS) is a technology that enables electronic devices such as mobile phones and drones to determine their physical location on geographic maps using massive data. The VPS works by analyzing the images and video captured by a camera and comparing them to a pre-mapped database of the environments. Using machine learning algorithms, the device can determine its position and orientation with a high degree of accuracy. The VPS offers higher accuracy and reliability compared to traditional GPS-based systems.

The VPS is an advanced technology that provides travelers with real-time views and visual landmarks, including hotels,

shopping malls, movie theaters, restaurants, and recreational zones. This provides location-based experiences. In the future, AI might be applied to many more untouched and unexpected service-related areas.

4) *Language Translator*: Information and communication technologies (ICTs) have impacted how tourism companies conduct business, particularly about how they reach out to their customers. This fact, combined with the demands of increasingly sophisticated customers and the need for rapid interaction with many partners, makes ICTs important to the tourism industry. Employees' modern workplace and communication styles change significantly from those who worked in the past [36]. Using a translation app efficiently eliminates language barriers and ensures communication between people who speak different languages. With the emergence of translation apps, one can rely on the advanced technology embedded in their smartphone to facilitate communication throughout their international journey.

Google Translate, Apple Translate, and Naver Papago are excellent options for any trip. These apps offer features such as live speech translation, the ability to input phrases in your native language, and AI to translate written text, including signs and menus. The Samsung Galaxy S24 comes with several AI-powered features, including live translation. This special feature translates phone calls in real-time directly on the user's device. The user essentially has a translator, which makes multilingual communication easier.

5) *Maximum Likelihood Algorithm*: AI algorithms have improved operational efficiency. Adopting AI tools helps optimize resource allocation, automate routine tasks, and save costs. For example, a company can forecast turnover and seasonality issues in the tourism industry. This helps companies make business decisions about hiring employees and the acquisition, installation, and maintenance of equipment.

Hotels are operating more efficiently through the use of AI. For example, inventory management, forecasting, and stock level management for items like linens and amenities are all done with AI-driven solutions. By doing this, the hotel can save expenses by making sure that guests' requirements are constantly met without going excessive. AI is used as a service to organize cleanup workflow and timetables. MLA systems can analyze guest check-in and check-out data to enhance housekeeping schedules and routes. This ensures that rooms are ready for guests and cleaned as efficiently as possible.

Current research aims to utilize machine learning, big data analysis, and predictive marketing strategy to propose an innovative marketing methodology and discover value components among the significant number of customer comments in interactive networks. By using big data analysis and machine learning, marketing research can be conducted more accurately, extensively, and inexpensively. Machine learning algorithms can analyze customer data and provide tailored recommendations for transportation, accommodation, and activities [37].

### III. RESULT AND DISCUSSION

There is much debate about whether AI will replace human intelligence in all areas of human work. In this debate, AI technology must answer many questions and provide solutions in various business sectors. Although AI can bring economic benefits by replacing employees and providing new customer experiences, it is still a new field that cannot surpass human intelligence and expertise.

Due to the nature of the hospitality industry, customers prefer human services to those provided by AI. A human workforce that remembers customers and has conversations with them would make them feel more valued. Although AI can replace the human workforce, customers still rely on it when it comes to diverse and complex situations.

Machines such as chatbots are limited to answering simple questions and performing tasks based on pre-programmed content. These technologies use the keywords in the questions to provide the answers. When there is an emergency and complex issue that needs to be resolved, customers still rely on the human workforce.

Technological advancements have drastically affected the travel industry, modifying consumer behavior and influencing business operations. Travel agencies and passengers frequently communicate through technology; therefore, collecting personal data from customers is essential to travel agencies that specialize in providing distinctive, customized travel experiences.

Extensive use of smartphones and other interconnected devices has led to collecting non-transactional behavioral data, including location, lifestyle, individual preferences, and personality characteristics. Service suppliers such as hotels and travel agencies can expand their customer base by offering more personalized recommendations and customized services. By utilizing the combination of these data to create more detailed and targeted customer profiles, they can expand their customer base.

Another major challenge in using AI is data security and privacy. AI stores past purchases, travel history, preferences, and behavior data. It must be programmed appropriately to ensure it does not violate information protection and privacy when using these data. Although AI is developing rapidly, there are still limitations in utilizing new technology. These limitations would be overcome by providing and using innovative solutions combined with technologies and up-to-date policies.

### IV. CONCLUSIONS

Many technologies are being utilized to improve customer service. The world is making great efforts to strengthen industrial competitiveness using big data and AI technologies, and tourism is facing increasing demands for new strategic solutions through the digital transformation of the existing tourism industry using cutting-edge technologies.

Tourists use AI to make decisions, get more information, find appropriate mobility, and obtain a better experience. Personalized technology generates tailored information based on customer preferences and travel experiences. AI readily satisfies clients' demands by offering promptly information about lodging facilities, airplanes, cathedrals, general infrastructure, and natural resources. This information can be

interactive messages, virtual tours, interactive booking systems, language translations, and GPS technologies.

Technological advancements in GPT may replace employees in traditional hospitality and tourism industries. GPT can replace occupations like tour guides, customer service personnel, and concierges, reducing the volume and degree of human engagement in generating and providing service experiences. Traveling overseas increases the chance of service communication between clients and providers from various nations, who frequently struggle with cross-cultural communication and speak different languages. Using a translation software is a successful way to break down language barriers and ensure communication among people who speak various languages.

The presence of AI in the tourism and hospitality sectors is increasing. AI algorithms in the tourism industry are useful for predicting demand, revenue, and business trends. As the application of innovative technologies expands, the tourism industry is expected to grow and change significantly. The adoption of AI in the hospitality industry through various AI applications contributes to substantial growth. AI has the potential to be employed in every element of corporate management.

AI has a well-established market and many quality applications can be purchased easily. As the tourism and hospitality industry gradually transforms into a platform business, the development of platforms and work processing methods using AI is expected to become a major trend in the industry.

In this paper, we reviewed the overall status of AI and the latest trends in the tourism industry. Adopting AI apps requires significant investments, including initial capital costs, maintenance, software updates, and staff training. Understanding the tourism and AI industry will help build an AI that will significantly transform the tourism industry in the future. AI technologies will be used to progress tourism businesses and are expected to help develop customized tourism products that meet customer needs.

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