

# A Comprehensive Review of AI-Powered Immersive Tourism Experience

**Dr. Shailja Tripathi**

Assistant Professor, IT and Operations Department IBS Hyderabad, the ICFAI Foundation for Higher Education  
(Declared as Deemed-to-be University u/s 3 of the UGC Act, 1956)  
shailja.tripathi@ibsindia.org

## HOW TO CITE:

Shailja Tripathi (2026). A Comprehensive Review of AI-Powered Immersive Tourism Experience. International Journal of Special Education, 41(11s), 776-797

## COPYRIGHT STATEMENT:

Copyright: © 2026 Authors.  
Open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

## ABSTRACT:

AI enables enhanced immersive tourism experiences, such as personalized recommendations, instant language translation, and dynamic itinerary generation, through these features and how the world operates nowadays. Through such features, travellers can engage with this space and experience a new, deeper, and more personalized travel experience that lasts. Technologies such as Virtual Reality (VR), Augmented Reality (AR), and Artificial Intelligence (AI) are on the rise in immersive tourism experiences. They are creating entirely immersive experiences with AI-driven personalization, which enable us to experience them as part of our total experience. Artificial intelligence and immersive technologies such as VR/AR offer immersive previews of the destination's setting, allowing tourists to interact with historical sites and experience the destination through interactive storytelling. According to AI, algorithms process user data systematically to provide users with personalized itineraries and recommendations, thereby enhancing overall satisfaction and user participation. This study seeks to investigate how one might complement artificial intelligence with suggestions and recommendations for travellers. It also covers the challenges of implementing AI technologies in tourism. Hence, the study proposes ways to mitigate the ethical concerns in AI-driven tourism. This study further emphasizes that the ethical issues regarding AI-driven tourism must be addressed through data privacy, consent, the avoidance of bias across data sources, and AI usage transparency. One should be mindful in this way when adopting sustainable practices. Methods involve, for instance, retaining a modicum of human control to save workers from losing their livelihoods, implementing AI in a sustainable manner that will produce little environmental impact, and applying laws like GDPR to protect user data.

**Keywords:** Virtual Reality; Augmented Reality; Artificial Intelligence; Tourism; Personalization; Immersive Experiences.

## Introduction

AI is an emerging technology-tourism technique for creating personalized, customized

recommendation solutions that foster enriched immersive tourist experiences (Srinivasan et al., 2024). Such systems are powered by AI to

interpret huge data to curate personalized travel advice, recommend ways, and support travel on-the-fly. Artificial Intelligence-enabled personalization makes travel more personal to the tourist. These experiences can be supplemented with interactive and immersive features like immersive media (Singh et al., 2024; Singh, A., 2025), by merging other technologies such as Virtual Reality (VR) and Augmented Reality (AR), to increase its performance from previous implementations. The AI in the tourism market is expected to grow from USD 2.95 billion in 2024 to USD 13.38 billion in 2030, accounting for a CAGR of 28.7%. In the tourism industry, AI-driven chatbots are performing around 80% of customer service interactions which suggest a strong move for automation (Dung Tran, 2025). Travelers are able to personalize and use AI systems to track their personal information about travel behavior, such as travel history, habits, online behavior and others, to offer personalised tourist recommendations in the form of suggestions on destinations, accommodation, activities and shops etc. They also provide customers with customized content tailored specifically for them. This type of personalized personalization enhances the experience of traveling and therefore also enhances the satisfaction of tourists (Doğan & Niyet, 2024). This way, the potential customers can also be recommended by AI-powered algorithms as Random Forest, XGBoost, Gradient Boosting based on how they suggest to the user based on preferences and travel history which enhances the recommendation quality much by customer satisfaction (Lalitha et al., 2023).

The combination of AI with VR and AR technologies can be used to provide virtual travel previews, interactive storytelling, and historical context, which helps tourists enhance their travel experiences, making them more engaging, more immersive, and unforgettable (Srinivasan et al., 2024). AI-driven virtual travel agents and smart itinerary planners have enabled AI-based virtual travel agents (Varghese & Pratyusha, 2024) and smart itinerary planners that provide personalized and immersive means of adapting to the travel

needs of travellers by adapting to customer individual interests and travel preferences (Varghese & Pratyusha, 2024). AI-driven recommendation systems have been reported to increase user satisfaction scores by 14% versus conventional ones, and 82.7% of recommendations correspond to user interest scores (Huang et al., 2024). AI systems providing translation capabilities to provide live translation, adaptive travel planning, and intelligent destination mapping make user-friendly, convenient journey experiences now even more available (Srinivasan et al., 2024; Farheen et al., 2024).

AI enhances operational efficiency, for example, through the use of customer support chatbots and identity verification with facial recognition techniques, which decrease waiting time and increase security (Doğan & Niyet, 2024). By optimizing resource allocation, regulating visitor flows, and minimizing environmental impact, AI supports sustainable tourism practices and promotes eco-conscious travel (Kumar et al., 2024; Eswaran et al., 2025). Though the potential of AI is huge in customization and improving tourist experiences and personalizing those experiences, it represents challenges to user perception about the use of data privacy and ethical implications. While it is promising as well, the fact is that, although it has huge advantages for tourists to personalize and improve their trips, the introduction of AI poses challenges like data privacy concerns and ethical aspects in the need for AI ethics in implementing such as data security etc. This is, as the space between automation in this process and human interaction continues to be a significant issue, as is the risk that AI can lead to over-tourism due to accidental over-tourism with the potential for AI if done incorrectly. With AI-powered features, the tourism industry will be even more revolutionized along with more efficient, pleasant, and sustainable journeys for visitors globally by its growth to be better in the tourism sector in the future as technology keeps progressing (Eswaran et al., 2025).

In fact, the advanced AI personal recommendation systems deliver immersive tourist experiences by analysing user data (behaviour, social media, and preferences) from personal recommendation systems. AI creates immersive tourist experiences through data analysis for tourists using user data and machine learning (ML) powered by natural language processing (NLP) to provide personalized recommendations for tourism in tourist attractions, activities, and itineraries, dynamically recommending and tailoring to the user by automatically recommending to tourists in real-time (Talukder et al., 2025). This makes the tourism experience hyper-personalized, enhancing engagement and satisfaction, even to the extent of merging with AR for richer interactions, combined with chatbots for real-time contextual assistance in conversation (Panigrahy and Verma, 2025). They are transforming travel planning, moving it out of standard searches and into personalized journeys, providing efficiency for both travellers and operators, and require strong data security to build trust.

The study further discusses core AI technologies used in tourism, such as natural language processing (NLP), machine learning, computer vision, biometrics, robotics, etc. The next section emphasizes the benefits of AI-based tourism, including personalized travel planning, customer service and support, immersive experiences, operational efficiency, resource management, weather and traffic predictions, automated travel insurance, enhanced safety and security, and sustainable tourism practices. The following section covers the benefits of AI-based user-generated recommendation systems, such as personalization and user satisfaction, context-sensitive and real-time recommendations, sentiment analysis, operational efficiency, user engagement, improved accuracy metrics, and overcoming information overload. Additionally, use cases of AI-based tourism are discussed in the next section. Next, ethical challenges like data security and privacy, algorithm bias and transparency, job displacement and depersonalization, technological and

regulatory challenges and sustainability and governance are discussed in the chapter.

### **Core AI Technologies in Tourism**

Artificial Intelligence (AI) is profoundly augmenting the tourism industry and giving rise to better personalization, optimized operations, and overall tourist experiences. The implementation of various AI tools such as Virtual and Augmented Reality, Natural Language Processing (NLP), machine learning, and computer vision is completely redefining the operations of the tourism industry and the manner in which tourist organizations engage with tourists. Various tasks such as chatbots and personal assistants, as well as predictive maintenance and recommendations, are made efficient and safe and provide enjoyable experiences for travel and tourism.

Core technologies such as Machine Learning (ML), Natural Language Processing (NLP), Computer Vision, and Robotics are employed to support operational efficiency and to provide personalized, seamless experiences (Gajdošík, and Marciš, 2019). The following are the core technologies used in AI-powered tourism:

#### ***Machine Learning Algorithms***

Machine Learning algorithms use the preferences, travel history, and web behavior of the users in providing recommendations on the destination, accommodations, and activities (Traversa, 2024; Khlopiak and Kviatkovska, 2025). Such personalization increases the relevance and satisfaction of the traveler experience (Doğan and Niyet, 2024).

To offer tailored travel recommendations for destinations, tourism recommendation systems (TRS) are based upon a large range of machine learning (ML) and deep learning algorithms to offer recommendations for tourists' travel and itinerary destinations and accommodations. The major recommendation architecture of tourism design is developed with respect to core recommendation architecture.

#### ***Core Recommendation Architectures***

Collaborative Filtering (CF): "Collaborative Filtering (CF)" is a method used by Artificial Intelligence-based tourism that recommends destinations, hotels, or activities to a user based on the interests or preferences of "similar" individuals or "neighbors." It predicts the interests of a particular individual by "identifying their neighbors," thereby solving the main information-management issue faced by the tourism sector due to its high volume (Aldayel et al., 2023). Some common algorithms are K-Nearest Neighbors (KNN) which finds similar users, and Matrix Factorization (SVD) which deals with the sparse rating data. SVD is Singular Value Decomposition, a powerful matrix factorization technique in linear algebra that decomposes any matrix (A) into three specific matrices, which is widely used for dimensionality reduction, noise removal, and uncovering patterns in data, as in recommendation systems.

Content-Based Filtering (CBF): AI-based tourism CBF offers very effective personalized travel recommendations by matching the user's likes, clicks, and past searches to item attributes like location, price, and amenities. Matching suggests similar new attractions or hotels that were liked by a user in the past. This bypasses the requirement for large user communities, which itself helps to solve the "cold start" problem in the case of new destinations (Absalamova et al., 2025). Recommends such items as might have been liked by a user (e.g., historical site, Nature Park).

Hybrid Systems: Hybrid AI in tourism is about combining different working methods—like content-based filtering, collaborative filtering and deep learning ones—to suggest highly personalized, in the moment, travel options to a destination. With the aid of big data, social media, and personal preference-slicing apps, these systems develop customized, dynamic itineraries and augment the tourist experience. Hybrid tourist AI systems leverage a mix of strategies. These systems utilize big data, social media, and user preferences to create dynamic, tailored itineraries that improve tourist experiences with added value beyond simple suggestions

(Forouzandeh et al., 2022). Use CF and CBF to get over the so called "cold start" (new users/items without any ratings) and "sparsity". More current models (Fuzzy TOPSIS, the Artificial Bee Colony (ABC) algorithm (Tiwari, 2024; Goel, 2025)) are optimization practices. In this case, the recommendation algorithm represents a hybrid method, identifying similar users and profiles them on the basis of their preferences and the external factors of city and month information (Khan et al., 2024).

### **Supervised learning algorithms**

These are often used for both classifications such as traveler type categorization and regression (for ratings, prices, etc.). The algorithms are:

Random Forest (RF): The Random Forest (RF) is a powerful and versatile ensemble learning method in machine learning that builds multiple decision trees and merges their predictions to produce a more accurate and stable result than a single tree. Random Forest (RF), a popular predictive analysis tool in Machine Learning, uses a multitude of decision trees to perform accurate predictions in tourism management, particularly in determining demand levels, popularity levels of a destination among tourists, and economic impact by considering various travel attributes that include tourists' expenditure level on a destination, weather conditions in a destination country/region, and social media perception of a destination. RF has shown high accuracy levels in classifying recommendations and trend predictions (Hu and Lin 2025).

Support Vector Machines (SVM): Support Vector Machines (SVMs) are powerful supervised learning models used for classification and regression, finding the optimal hyperplane (decision boundary) that best separates classes by maximizing the margin (distance) to the closest data points, known as support vectors. For the classification of tourist landmarks and tourist attractions based on textual features and processing of high-dimensional data. SVM is used for image/text classifiers, such as for tourism to forecast visits, forecast demand,

and/or to study the traveling habits of users for loyalty programs, achieving better results on forecasts and consumer preferences than the classical models (Pai et al., 2006).

**XGBoost & Gradient Boosting:** Gradient Boosting is a machine learning technique that builds a strong predictive model by combining a series of "weak" models (typically shallow decision trees or "decision stumps") in a sequential manner (Tahmi et al., 2026). XGBoost (eXtreme Gradient Boosting) is an implementation of Gradient Boosting in an efficient manner; the Gradient Boosting algorithm is a variant of the decision trees ensemble method. Both XGBoost and Gradient Boosting are used in the tourism industry for various tasks of predictive modeling (Tahmi et al., 2026).

**Decision Trees (DT):** DTs are one of the basic supervised machine learning algorithms which are interpretable and flexible enough to perform classification as well as regression. They can be applied in the tourism industry for the purpose of building recommendation systems and understanding customer behaviour. In Machine Learning, a decision tree is a hierarchical and flowchart-like structure which recursively splits a dataset into smaller, more homogeneous subsets based on specific feature values. Applications of these models have been applied to the tourism sector, where they have been used to predict customer satisfactions, identify target markets, and optimize services offered (Christodoulou et al., 2020).

**Logistic Regression:** Machine learning-based Logistic Regression (LR) predicts categorical outcomes (Yes/No, 0/1) by estimating probabilities, making it well suited for tourism to forecast binary decisions such as booking/not booking, returning/not returning, or choosing destination A/B, using tourist data (age, price sensitivity, past travel) to understand why certain choices are made, informing targeted marketing, managing capacity, and enhancing guest experience. Used as a generalist regression to predict binary result (e.g., cancellations of a

reservation or category preferences) (Pullolla Panidhar, 2023).

### **Deep Learning & Next Generation Methods**

Contemporary systems apply deep learning to unstructured data (e.g., reviews, images) such as:

Recurrent Neural Networks (RNN) & Long Short-Term Memory (LSTM) are used for the sentiment analysis in travel reviews and to predict sequential itinerary. LSTM is best in studying long term user preferences. A significant contribution to the field of tourism analysis and prediction can also be achieved by the implementation of the power of Recurrent Neural Networks and the enhanced variant, known as Long Short-Term Memory. These deep learning architectures are effective and significant tools that can help in the prediction and analysis of the overall demand and flow by learning the patterns and trends from the past (Li and Cao, 2018). Convolutional Neural Networks (CNN) are revolutionizing tourism by enabling computer vision for destination identification using image recognition techniques; sentiment analysis of tourists to enable quality improvement in services; classifying tourist spots to enable quality planning; and forecasting tourist flow to enable quality management (Meng, 2024). These are used for image-based recommender such as landmarks in user produced pictures.

Semantic-Enhanced Deep Learning is used for processing user preferences and interests using CNNs for fine-grained sentiment analysis for full-scale, deep learning on user interests and preferences (Zhang, 2023). The fusion of CNNs and RNNs enables the image analysis and user generated content assessment, respectively. This deep learning strategy is useful in tourist destination classification and understanding of user reviews, ultimately allowing for improved and personalized recommendations.

The fusion of Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), specifically Long Short-Term Memory (LSTM) networks, has emerged as a powerful approach in the tourism industry for processing



complex, multi-modal, and time-dependent data. This hybrid architecture combines the spatial feature extraction capabilities of CNNs with the temporal sequence modelling strengths of RNNs (Chen, 2024).

### **Unsupervised & Optimization Algorithms**

**K-Means Clustering:** Segments of tourists based on properties from around the same sector, like budget or activity preference. K-Means Clustering in tourism segments tourists or destinations into groups with similar traits (demographics, behaviour, preferences) for personalized marketing, better resource allocation, and improved recommendations, by grouping data points (like visitors) close to cluster centers (centroids) based on distance, helping businesses understand traveller types (e.g., budget, adventure) or classify attractions (e.g., cultural, natural) for targeted strategies. K-Means Clustering in tourism segments tourists or destinations into groups with similar traits (demographics, behaviour, preferences) for personalized marketing, better resource allocation, and improved recommendations, by grouping data points (like visitors) close to cluster centers (centroids) based on distance, helping businesses understand traveller types (e.g., budget, adventure) or classify attractions (e.g., cultural, natural) for targeted strategies (Zhang and Wang, 2025).

**DBSCAN:** DBSCAN (Density-Based Spatial Clustering of Applications with Noise) is used in tourism to cluster tourists by behaviour/location, find popular zones, manage over tourism by spotting dense areas and spill over, and create personalized recommendations by locating clusters with similar preferences (like movement patterns, tech use, or attraction types). It's excellent for finding irregular shapes and filtering noise, helping destination managers understand tourist flow and develop targeted strategies (Pensiri et al., 2022).

**Association Rule Mining:** Association Rule Mining (ARM) in tourism finds hidden patterns, like which attractions tourists visit together (e.g.,

{Museum} → {Park})), to guide route planning, personalized recommendations, and marketing by revealing visitor behaviour, improving resource allocation, and enhancing the travel experience, using methods like Apriori on datasets from bookings or Wi-Fi tracking (Arreeras et al., 2019). Apriori and FP-Growth Algorithms, for example, uncover the services used by guests to buy together (e.g., unique travel and hotel combinations).

**Route Optimization:** Algorithms such as Dijkstra's and Depth-First Search (DFS) are incorporated into Travel Recommender Systems, intelligent software to generate optimal travel paths between proposed nodes. Dijkstra's algorithm and Depth-First Search are two essential graph-based methods that are widely applied in tourism, particularly in route optimization, navigation, etc., from a tourism point of view. Dijkstra's algorithm, in essence, implies a short path between destinations, which may include Global Positioning Systems in vehicles driven by tourists, while DFS may be implemented in scenario-based route optimization according to a specified set of points of interest, such as visiting a given set of landmarks along a path. (Xiao et al., 2023).

### **Natural Language Processing (NLP)**

NLP drives AI chatbots and virtual assistants to understand user questions in natural language, give responses instantaneously by answering them, manage reservations, and provide round-the-clock help. NLP can be used in creating a chatbot service aimed at offering customers' support around the clock, thus allowing the human workforce to focus on complex issues (López-Naranjo et al., 2025; Traversa, 2024). The technology increases the level of customer satisfaction since it offers immediate solutions (Doğan & Niyet, 2024). Efficient for sentiment analysis and feature extraction for "aspect-based" features (i.e., cleanliness, nightlife) from reviews on TripAdvisor and Booking.com. Based on the sentiment of user review data, CNNs help in understanding user preference to extract semantic elements from a large amount of tourist reviews data and the same method used to

analyse user opinions (Zhang, 2023; Khan et al., 2024).

### **Computer Vision & Biometrics**

AI technologies like computer vision are used in facial recognition for quick identity verification at airports and hotels, improving security and efficiency (Doğan & Niyet, 2024). It is applied to facial recognition for airports that can lead to better security and more streamlined check-in/boarding e.g., Orlando International Airport. Computer Vision (CV) & Biometrics are transforming tourism with frictionless, secure and personalized experiences such as facial recognition (airports, hotels), fingerprint scanning, and eye tracking to speed up check-ins, border control (e-gates), and tailor-made services, while also enhancing security and enabling new insights into traveller behaviour despite ongoing privacy concerns. CV powers these systems by studying specific physical characteristics and behaviours to minimize waiting time, human error, and making contactless travel easier from booking to boarding (Ioannou et al., 2020).

### **Generative AI (GenAI)**

GenAI assists in the process of hyper-segmentation and hyper-personalization. This helps the tourism industry personalize its offerings according to a person's preferences and requirements. This strategy is also known as "hyper-personalization" and helps the development of customized content including tourists' (Florida-Benítez and Martínez, 2024). GenAI is transforming tourism through the development of personalized travel itineraries, 24/7 AI concierge that provides immediate help, producing dynamic content (such as itineraries, marketing materials) and performing operational optimization with the aid of analytics, resulting in greater customer satisfaction and reshaping tourism tasks into collaborative processes for efficiency, content creation and making data-informed decisions, though raising concerns about ethics, privacy, and workforce impact. (Saleh, M. I., 2025). It is used to build conversational, personalized and rich travel planning experiences — like those provided by

TripAdvisor or Expedia — and to generate marketing pieces for destination management.

### **Robotics**

Robots are increasingly being used in hotels for purposes such as check-in, room service, and concierge services, improving efficiency and customer satisfaction (Sánchez et al., 2024; Kumar et al., 2025). Intelligent robots are able to give tourists accurate and updated information as per their needs, thus enhancing their travel experience (Sánchez et al., 2024). Robotics assists in cutting costs and optimizing service time, thus being quite effective in peak sectors such as hotels and restaurants (Pero-Gascón et al., 2019). Robots transform the overall customer experience as they provide personalized services and information, which ultimately result in an improved level of satisfaction among the hotel customers (Kumar et al., 2025). Robotics technology promotes innovation in the tourism industry. This promotes a competitive environment for the businesses to differentiate and compete effectively (Sánchez et al., 2024). The increasing labor shortages can be solved by robotics since it will automate tasks (Schiffmann, 2024). The labor shortages are a problem that has been made worse by the global outbreak of Covid-19. Figure 1 illustrates the core AI technologies used in tourism.

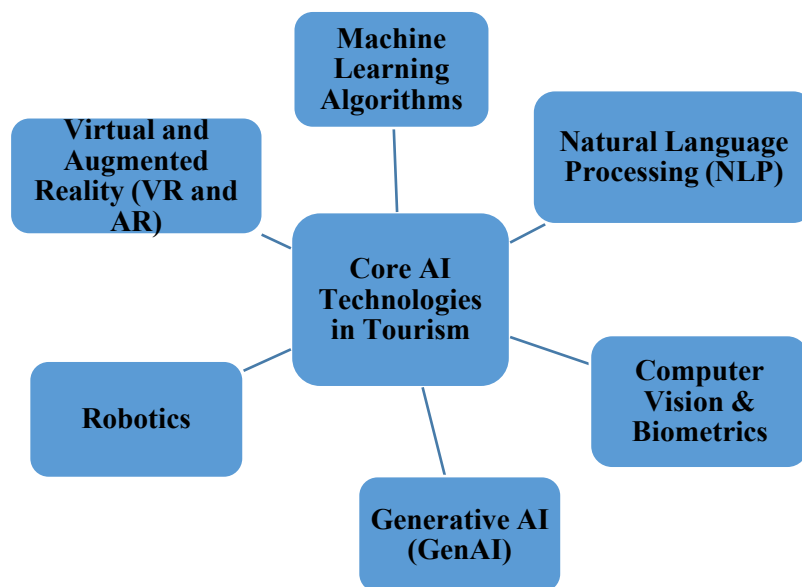
### **Virtual and Augmented Reality (VR and AR)**

Immersive AI-based tourism experiences that rely on virtual and augmented reality and artificial intelligence based experiences (AI + VR + AR) of integrated technologies are redefining the means by which the travel experience will be accessed by travellers toward a variety of destinations. These solutions provide personalized, interactive, sustainable and environment-friendly travel experiences that leap over geographical borders of tourism. By making use of AI, VR and AR, tourism companies can offer virtual travel previews, increase cultural proficiency and encourage sustainable tourism practices through VR, VR and AR. The

subsequent sections deal with different facets of immersive AI-driven tourism journeys.

VR and AR technology allows the tourism industry to let visitors experience a destination virtually, with early warning and interactive stories, making it possible for tourists to experience a place without the physical touch.

Especially when comparing historical and cultural sites, AR can superimpose the historical narrative and context onto the real landscape (Srinivasan et al., 2024). VR may also help protect the environment through reducing the ecological impact of travel, such as experiencing natural wonders with minimum disruption of fragile ecosystems (Singh & Kaunert, 2025).



**Figure 1.** Core AI Technologies in Tourism

Source: Author Own Contribution

### Benefits of AI-Powered Tourism

Artificial Intelligence (AI) is helping the tourism sector to revolutionize operations to drive operational efficiency, enhance an individualized customer experience and push for sustainable strategies. AI tech is changing every part of travel: pre-trip planning, post-trip communication and even offering new technology solutions that best meet the expectations of today's travelers. This transformation is driven by a variety of AI tools, including but not limited to machine learning, natural language processing and robotics, that fundamentally alter how service is developed, delivered and used in tourism. AI in tourism for hotel chains, in turn, can lead to personalized feedback, intelligent chatbots for 24-hour assistance, flexible pricing, speeded-up processes by means of facial recognition and automation, predictive analytics that will identify flight disruptions faster and security enhancements

(Chirag Bharadwaj (2025)) making hotels not just booking agents, but a fully serviceable partner to improve speed and satisfaction. The benefits of AI in tourism are:

#### *Personalized Travel Planning*

Utilizing this information, AI algorithms analyze the preferences, travel history, and online behavior of users to offer recommendations that are personalized, beyond suggestions of the generic (Traversa, 2024; Eswaran et al., 2024). AI allows virtual travel agents and smart itinerary planners to provide customized travel solutions while catering to personal choices and needs (Varghese & Pratyusha, 2024). AI analyzes traveler data, preferences, and social media behavior to recommend customized itineraries, hotels, and local activities (e.g., Booking.com, TripAdvisor). Based on past behaviour or preferences, AI can recommend personalized



travel experiences and recommended activities, hotels you should stay in, and so forth.

### ***Customer Service and Support***

AI-powered chatbots and virtual assistants receive routine and advanced queries, improving customer service and freeing up human resources for more complex communication (Traversa, 2024; Chandrasekaran & ShabbirHusain, 2025). In the hotel and restaurant industry, robots are extensively utilized in the delivery of customer service in an efficient manner along with consistent service (Sousa et al., 2024). Virtual assistants like "Elysa" on Expedia help customer's book flights and hotels, answering, on average, high-volume, routine queries instantly. AI offer real-time customer-support services for reservations, queries, assist, etc., which decreases the time consumed by humans. Real-time language translation services that break down communication barriers. Reviews customers' reviews and social media to assess satisfaction and make improvements to services. Robots assist with check-ins provide directions and tour, as well as give concierge service at airports and hotels (Max Liul, 2026). AI-powered chatbots and virtual assistants provide tourists with real-time updates and assistance, promoting their eco-friendly travel choices while mitigating the effects of mass tourism (Eswaran et al., 2024).

### ***Immersive Experiences***

AI-enhanced augmented reality (AR) and virtual reality (VR) technologies enable travel to be immersive, allowing the user to engage with destinations before he heads there (Esfandiar et al., 2024; Badouch et al., 2025). AI-driven virtual experience curators design engaging and interactive experiences that ultimately improve tourists' satisfaction (Goyal et al., 2025). VR powered by AI provides virtual tours, enabling travelers to experience destinations prior to booking. AR apps offer real-time, on-the-ground information, historical context, and translation. Provides immersive virtual tours and in-destination experiences. VR and AR technologies are enabling travelers to virtually visit destinations and preview their travel experience

and make decisions before the trip itself. This is especially relevant for marketing and improvement of pre-travel environment (Srinivasan et al., 2024; Panigrahy & Verma, 2025). The AI improves these experiences, making it possible to receive personal recommendations and adaptive travel planning, adjusting the virtual experiences to the user, allowing them to engage with and shape the tourism experiences online (Srinivasan et al., 2024; Kaya et al., 2025). VR and AR applications using AI in personalization use AI, machine learning, and natural language processing for personalized and one-of-a-kind experiences (Patni & Raut, 2025).

### ***Business Opportunity (Operational Efficiency and Resource Management)***

According to Das (2024) and (Eswaran et al., 2024), predictive analytics and machine learning optimize resource allocation, demand forecasting, and crowd management, leading to better operations and lower ecological footprint. AI systems use real-time data to identify and respond to potential threats, providing safety and a secure environment for the traveller (Das, 2024). Smart cities and tourist sites (e.g., Venice, Singapore) use AI to track crowd density and traffic in real time for safer experiences and to counter the effects of over tourism. Facial recognition enables more accurate airport/hotel arrivals and baggage management, whereas AI ensures route optimization and energy management. Forecasts flight delays and inconveniences, including demand, enabling proactive management and targeted promotions for impacted travellers. AI solutions spot and prevent fraudulent bookings and transactions, preserving revenue (Max Liul, 2026). AI technologies, including predictive analytics, allow more accurate forecasting of tourism demand and decrease resource wastage and environmental impact (Singh & Singh, 2024; Talukder et al., 2025). Smart destination management systems adopt AI to maximize resource utilization, efficiently use energy and water, and minimize the carbon footprint of

tourism activities (Eswaran et al., 2024; Talukder et al., 2025).

VR, AR and AI aid tourism revenue generating and its marketing. For example, metaverse supports hybrid modes of tourism of which the one mentioned in this study can be most meaningful to pandemics and the promotion of sustainable travel behaviour (Panigrahy & Verma, 2025). AI in smart applications: intelligent recommendation systems and dynamic pricing algorithms have revolutionized the tourist's relationship with destinations in terms of efficiency and satisfaction (Kaya et al., 2025). Though costly to implement, such innovations are new doors for tourism agents to step into and exploit for experiential (Panigrahy & Verma, 2025).

AI algorithms are used by hotels and airlines to dynamically adjust pricing in real time based on competitor rates, demand, and user profiles to generate higher occupancy and revenue (e.g., InterContinental Hotels Group). Modifies the costs of flight, hotel, and automobile rental based on demand and competitor behaviour. AI-powered IoT systems track luggage, minimizing delays. AI also assists airlines with predictive maintenance, like forecasting engine failures before they happen. By analyzing complex logistics, AI compiles detailed, personalized trip itineraries — in an intuitive, personal and intelligent way.

### ***Sustainable Tourism Practices***

AI has made environmental monitoring easier with smart sensors and analytics and also contributes to sustainability by evaluating its ecological impact and taking proactive steps towards conserving resources (Badouch et al., 2025; Eswaran et al., 2024). The AI-equipped smart infrastructure development systems make destinations more resilient and competitive (Das, 2024). AI does this by analyzing travel patterns to optimize routes and carbon emissions, so companies like Skyscanner can recommend a better mode of transportation and accommodation for an eco-friendly reason (Max Liul, 2026). Immersive technology contributes to

green tourism by lowering the need to venture out to the “real world” and reducing carbon footprints. According to Talukder et al. (2025), AI helps travelers select sustainable places to stay and activities suited to their individual needs, thereby fostering responsible tourism to form a culture of responsible tourism. These AI-driven educational tools create and foster education on the importance of sustainability and stimulate behavior change among tourists (Chang, 2025). AI-based systems support environmental monitoring by collecting and analyzing data to inform better management of natural resources and conservation of biodiversity (Talukder et al., 2025). AI-based automated waste management systems help reduce pollution, contributing to cleaner tourism destinations (Talukder et al., 2025). AI in marketing strategies has effectively driven the implementation of sustainable tourism by attracting eco-friendly travellers (Singh & Singh, 2024; Talukder et al., 2025).

### ***Weather and Traffic Predictions and Automated Travel Insurance***

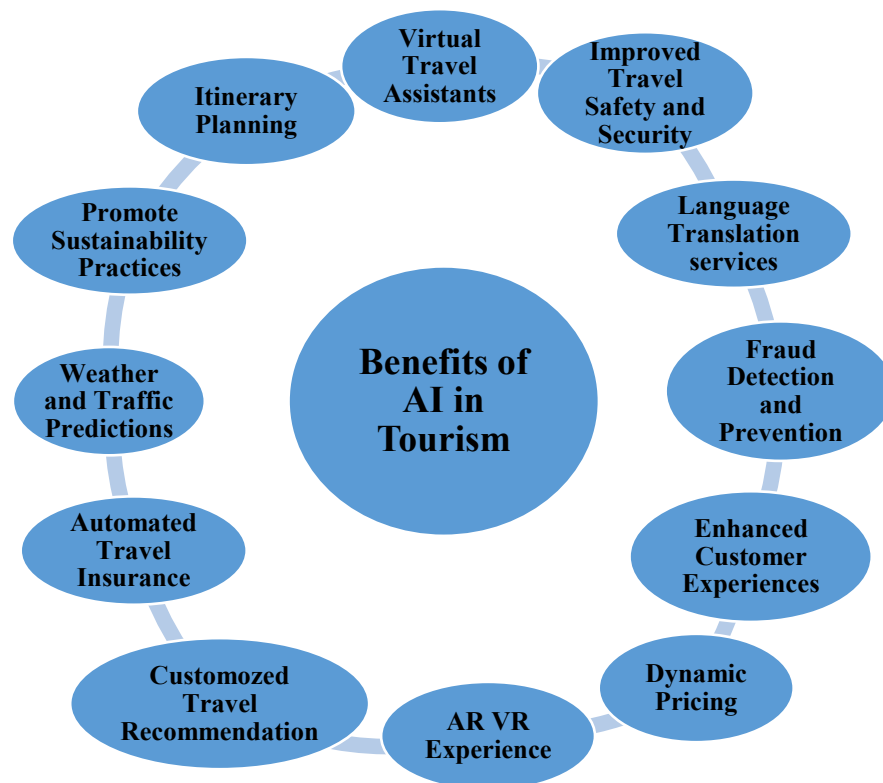
AI is used to predict weather and traffic conditions using live data given from satellites, IoT sensors, and historical data. This allows travellers to avoid delays, manage routes and protect themselves, especially when it is extreme weather season or in unknown areas with unpredictable transport networks. Real-time quoting, personalized policies, and easy access to claim processes ease travel insurance with AI. Its risk assessments are based on traveller profile and trip data, leading to fast approvals and more pertinent coverage, saving the need for user approval time and increasing user confidence (Octal IT Solution LLP, 2025). Figure 2 shows various application of AI in tourism.

### ***Enhanced Safety and Security***

As AI drives facial recognition systems for faster check-in at airports and hotels at all levels, real-time identity verification gives new levels of security (Dung Tran, 2025). A new trend in AI will be that it tracks traveller activity for abnormalities. When unauthorized access or activity is detected in areas of secure security, or

abnormal movement patterns are reported, AI can raise an immediate alarm about it—helping to stop such a violation of security before it starts to grow bigger (Dung Tran, 2025). Conducting regular audits, varied training datasets, open and diverse training datasets, regular audits, as well as reasonable escalation protocols and clear escalation procedures, all are part of that fair and transparent procedures assure fairness and

transparency by ensuring fairness in and transparent escalation mechanisms. Customers really do trust you with their data—ethical AI helps to of their data. It's why AI adoption requires a strong foundation of AI compliance with good governance – ethical AI is important for credibility and scaling up that trust that comes at a solid basis for credibility and scaling responsibly.



**Figure 2.** Benefits of AI in Tourism

Source: Author Own Contribution

### Use Cases of AI-based Tourism

The following are the most common use cases of AI from the tourism sector.

#### ***Hilton: “Connie”, AI Concierge Robot***

With IBM Watson, Hilton unveiled AI-powered concierge robot “Connie.” Connie interacts with guests, answering questions about hotel amenities, attractions in the area, directions to travel places or areas of interest. It uses machine learning to improve its responses over time, providing guests in hotels with an even better environment.

#### ***KLM Royal Dutch Airlines – AI for Customer Service***

KLM employs AI-powered chatbots to help travellers across channels including Messenger, WhatsApp and Twitter. Check-in notifications, confirmation for bookings, boarding passes and flight status updates are all handled by these bots that provide instant multilingual help and lessen the burden of human agents.

#### ***Airbnb: Custom Recommendations***

Airbnb incorporates AI to provide individual travel suggestions according to user searching, past bookings, reviews and preferences. Its machine learning algorithms also advise on

unique stays and local experiences by recommending new experiences, making the user's experience more tailored and engaging.

### ***Google Travel — Smart Travel Planning***

Google Travel employs artificial intelligence (AI) to bundle flights, hotels and destinations as one interface. It forecasts hotel and flight prices, and offers itinerary recommendations based on user interactions and past trips, making travel planning easier with insights that come from data.

### ***Skyscanner - Dynamic Pricing & Chatbots***

Using AI models for dynamic price strategies, Skyscanner allows travellers to discover the most attractive airline deals in real time for trips through smart algorithms and data analysis, while also delivering valuable insights to make decisions on specific pricing strategies and booking. Product development requires an insightful understanding so a good AI chatbot development company helped in giving the users the best result to explore and compare destinations, options and book tickets on all the platforms like Facebook Messenger.

### **Benefits of AI-Based User-Generated Content (UGC) in Tourism**

AI-based UGC in the tourism industry leverages the potential of artificial intelligence tools like NLP or machine learning algorithms with 'user-generated content,' which can be used in the generation of 'personalized recommendations,' 'market automation,' 'improving customer experience,' 'predicting trends,' or 'maximizing content creation.' This enables raw data collected from users or customers to be 'processed into insights' (Bhardwaj et al., 2025).

AI-powered recommendation systems have a big impact on the travel experience by utilizing user-generated content (UGC) to generate much more personalized and contextually-aware travel recommendations. These systems are built to analyse large amounts of data from reviews, images, social media posts, and other significant sources, employing deep machine learning algorithms to understand users' preferences and behaviours. Incorporating UGC with AI, these

systems can deliver relevant suggestions, where both contribute to more personalized recommendations.

In particular, through the incorporation of UGC, these technologies can provide personalized content and AI will be used to make tailored suggestions based on UGC which help in a better user experience and satisfaction and in turn they also can facilitate customer preference and interaction.

### ***Personalization and User Satisfaction***

AI systems complement AI-enabled personalized experience by including user-generated content (reviews, social media posts) to help in the process of increased engagement and satisfaction of the users (Bhardwaj et al., 2025). AI-powered systems analyse user-generated content (UGC) from reviews and ratings to obtain insights about user preferences and recommend specific content accordingly. This customization is made possible by content-based and collaborative filtering algorithms which take in the personal data of the user to recommend destinations, accommodations, and activities corresponding with personal interests (Bhardwaj et al., 2025).

### ***Operational Efficiency and User Engagement***

AI helps in the improvement of efficiency in the tourism sector through the automation of processes and in real-time customer engagement. UGC like Chatting systems offer immediate customer support through virtual assistants, thus promoting instant customer satisfaction (Doğan & Niyet, 2024; Traversa, 2024). These systems enable smooth interactions between members of this group by providing them with "real-time information on attractions, accommodations, and events in a destination and thereby enable personalization of travel on-the-go. AI-powered systems can increase user engagement and satisfaction by providing personalized travel suggestions. These systems take into account things like user preferences, travel history, and current trends to provide recommendations that are beneficial to the user—thus making their travel experience better. For example, AI-driven

personalization has proven to be effective in enhancing customer satisfaction and engagement as seen through the use of real-world applications, for example when employed by TripAdvisor and Expedia (Bhardwaj et al., 2025).

### ***Context-Sensitive and Real-Time Recommendations***

Context-sensitive recommendations in the tourism industry promote the power of real-time recommendations through the usage of dynamic information gathered from AI-based User-Generated Content (UGC) like tourist location, weather patterns, time of the day, and tourists themselves, thus breaking through the limitations of utilizing the user profile alone to respond ever-changing tourist requirements instantly in their specific context (Yoon and Choi, 2023; Yoon and Choi, 2026). With AI systems, real-time data can be captured, from current location to weather and user activity to recommendations based on all relevant historical data. This guarantees relevant travel advice that boosts their travel experience in near real-time (Manos et al., 2024).

### ***Overcoming Information Overload***

Addressing information overload within AI-based User-Generated Content (UGC) in tourism refers to utilizing artificial intelligence for filtering, summarizing, and personalizing the overwhelming amount of traveller reviews, photographs, and videos. With tourists overwhelmed by inconsistent information, AI facilitates the shift from raw data to curated, high-value insights that, in turn, reduce cognitive load and enhance decision-making (Talakoti, et al., 2025). AI-driven recommendation systems help alleviate the problem of information overload by processing massive amounts of UGC to find relevant recommendations. It allows travelers to find tailored suggestions without being bombarded with information from the multitude of websites (Zhang et al., 2023). Conversely, semantic-enhanced and deep learning-based systems are capable of performing fine-grained sentiment analysis on large-scale tourist review corpora, allowing holistic modeling of user interests and preferences (Zhang et al., 2023).

### ***Sentiment Analysis***

One of the most significant AI technologies in the tourism and hospitality business is sentiment analysis of User-Generated Content (UGC) through the use of Artificial Intelligence (AI) technologies, i.e. Machine Learning (ML), Deep Learning (DL), and Natural Language Processing (NLP) (Liu et al., 2026). TRS with AI-based UGC systems can also look into the emotion of UGC reviews for sentiment analysis to gain insight into what users like and feel, thereby leading to personalized recommendation. For instance, the VADER sentiment analysis converts sentiment scores to ratings to improve recommendation accuracies by aligning them with user sentiments (Darraz et al., 2025). One method that has emerged as the current requirement in the tourism industry is the application of AI-based sentiment analysis on User-Generated Content (UGC), such as reviews, social media content, or tourism videos, which allows for valuable information extraction on the enormous unstructured data available on the internet. Touristic emotional data can be analysed with the assistance of Machine Learning, Deep Learning, or Natural Language Processing (NLP) algorithms (Liu et al., 2026).

### ***Better Accuracy Metrics***

AI-based UGC in tourism is now rapidly moving from simple keyword monitoring to more sophisticated and contextual analysis using AI technologies in order to improve the accuracy of trend prediction, sentiment understanding of travellers, and personal recommendations. Advanced, high-accuracy models are outperforming traditional models with 93.4% in demand forecasting and 96.7% in recommendation engines (López-Naranjo et al., 2025). Hybrid models which combine different techniques (e.g., combining neural networks with econometric models) has emerged as a promising way to increase forecasting precision (Hammad et al., 2025). Root Mean Square Error (RMSE) and Mean Absolute Error (MAE) are used to measure the precision of demand forecasting, with new hybrid models demonstrating superior, low-error performance. Figure 3 shows the benefits of AI-based UGC in tourism sector.





**Figure 3.** Benefits of AI-based UGC in Tourism

Source: Author own contribution

### Challenges and Ethical Issues

Emerging immersive technologies are beneficial but in turn, pose challenges like relatively high development costs, technical complexity, and accessibility issues. While these are becoming increasingly woven into tourism experiences (Badouch et al., 2025), ethical concerns regarding data privacy and responsible AI developments have become important (Badouch et al., 2025). AI-powered recommendation systems contribute to enhancing the travel experience with the utilization of UGC, but face certain issues and implications they need to address. They are built on a large amount of user data. Data protection and ethical considerations will rank as core concerns, as these systems require huge amounts of information about the public to function successfully. Therefore, responsible implementation of AI is vital to sustain the trust of users and safeguard personal data (Kumar et al., 2024). Given that technology is changing, especially AI for traveling it is possible to develop innovative techniques that can enhance personalized and sustainable tourism which will undoubtedly be a huge blessing to travelers and the environment alike (Kumar et al., 2024). Artificial Intelligence's integration into the tourism industry is an important challenge as well as an exciting opportunity for tourism professionals. AI tech in tourism in the digital economy, then, does not only have a positive effect on travel, personalized service, and operational efficiency in this digital economy

such that in a highly resource constrained industry, but also on the sustainable development of an already resource limited industry. But it introduces ethical questions of its own such as data privacy, transparency, and algorithms for ethical concerns related to privacy.

### *Data Privacy and Security*

AI-based personalization applications used for travel often require the manipulation and analysis of personal data with significant privacy concerns. However, its impact decreases when systems are deployed with AI-powered technology to predict threats, classify threats, or detect fraud. Travelers are aware of how their data is collected and are therefore likely to be interested in these issues, which justifies the call for clear data practices and privacy measures (Ferhataj & Memaj, 2024; Tee et al., 2024). Ethical use of AI in tourism is not trivial; stringent data protection guidelines should be set up to safeguard against unauthorized access and misuse of personal information (Binesh & Syah, 2025; Chang, 2025).

### *Algorithmic Bias and Transparency*

AI systems for tourism can unwittingly propagate biases, and these biases may result in discriminatory conduct. For example, in personalised recommendations and pricing strategies, algorithmic decisions can sway fairness and inclusivity (Tee, 2024), highlighting this as a worrying phenomenon. Transparency with regards to AI systems is an essential requirement

for the trustworthiness and fairness of AI algorithms to be based on consumer confidence and biases to be diminished. Some of these are the AI decision-making process and accountability to users (Binesh & Syah, 2025; Tee, 2024).

### ***Job Displacement and Depersonalization***

Services becoming AI-enabled will lead to job loss in tourism industry since operations which were usually carried out manually by human beings are now being carried out increasingly by machines (Gabriel & Tileagă, 2024). While AI-enhanced interaction lacks the humanity associated with hospitality and tourism services (Gabriel and Tileagă, 2024; Sharma, 2024), another negative dimension of tourism experiences that does arise is depersonalization.

### ***Technological and Regulatory Challenges***

There are technological roadblocks that impede the successful implementation of AI to tourism, such as inadequate technology infrastructure and digital literacy amongst stakeholders (Andrianto et al., 2025; López-Naranjo et al., 2025). Regulatory compliance is also a difficult hurdle to consider, although existing frameworks may not well respond to the unique ethical issues brought by AI in tourism. Regulations and the ethics around them should be sector-specific to guide responsible use of AI (Jiang, 2025; Chang, 2025).

### ***Sustainability and Governance***

AI technology aids in improving sustainable tourism practices via streamlining resource allocation and increasing environmental monitoring. However, maximizing these possibilities must be undertaken with well-regulated governance and stakeholder inclusion, so that the implementation of AI applications can be in line with sustainability objectives (Gabriel and Tileagă, 2024; Chang, 2025). Thus adopting sustainable tourism measures with public-private strategic planning is important (Chang, 2025). AI offers disruptive potentials in tourism sector yet its implementation has to be treated judiciously by taking into account the ethical issues and technological aspects of deployment due to its use. It should be paramount to consider how a novel strategy can blend with ethics in a creative way that the practical integration towards an ethical approach, so that AI benefits are not only realized in general within an individual slice of the population, but the environment for a wider community, as part of a social setting for sustainability. It should be the responsibility of policymakers, industry stakeholders, and researchers to design, adopt, and execute a moral framework and governance arrangements for responsible tourism's use of AI that help with its responsible use. Figure 4 presents the ethical issues generated by AI in tourism sector.



**Figure 4.** Ethical Challenges of AI-Based Tourism

Source: Author Own Contribution

### **Mitigating Strategies to Address Ethical Considerations of using AI-Powered Tourism**

AI-driven tourism AI technology offers tremendous potential as well as ethical conundrums of its own in the tourism sector. AI applications can deliver enhanced experience, greater personalized services, business savings, and environmental benefits for tourism and performance enhancements. Yet these benefits have ethical problems with considerations of privacy, transparency and algorithmic bias. But challenging these ethical concerns is essential to ensure responsible and sustainable AI in tourism, as AI is a global trend across the global tourism enterprise. It carries both the weight of issues relating to data privacy and transparency.

#### ***Be Transparent Around AI Algorithms***

However, in the context of AI-personalization within the tourism sector, data privacy and transparency is the new normal. The vast majority of travellers are frightened that the data being captured and processed is utilising their data, and hence, transparency in the use of data practices and strong privacy policy becomes crucial in building up the trust with consumers (Ferhataj and Memaj, 2024; Tee, 2024). So, being transparent and sharing AI algorithms is key to guiding tourists on what are the uses of their data to avoid misuse. Also included is clear communication with public about its collection patterns and how this information will be used (Ferhataj and Memaj, 2024; Binesh and Syah, 2025). Tourism AI technologies typically require significant personal data in order to offer tailored services. This problem raises a major privacy issue. Robust data protection measures will be needed to protect travelers' information (Tee, 2024; Ferhataj and Memaj, 2024). User consent and clear data practices are vital to building trust among travelers. Such clear and complete privacy policies are mitigations against privacy risks, along with an ease for users to manage their data (Ferhataj and Memaj, 2024; Andrianto et al., 2025).

#### ***Diverse Datasets and Human Oversight***

AI systems in tourism are likely to inadvertently reinforce bias, leading to discrimination and exclusion, as some of the sites' data use might have mistaken. These biases can exist, for example in the nature of the travel experience, because they are algorithmic and biased in an exclusive way, requiring diversity of data and human intervention to be able to minimize this problem (Tee, 2024). The urgency for the global tourism domain is to alleviate these problems owing to the challenges posed by new digital methodologies like predictive analytics and deep-divide models.

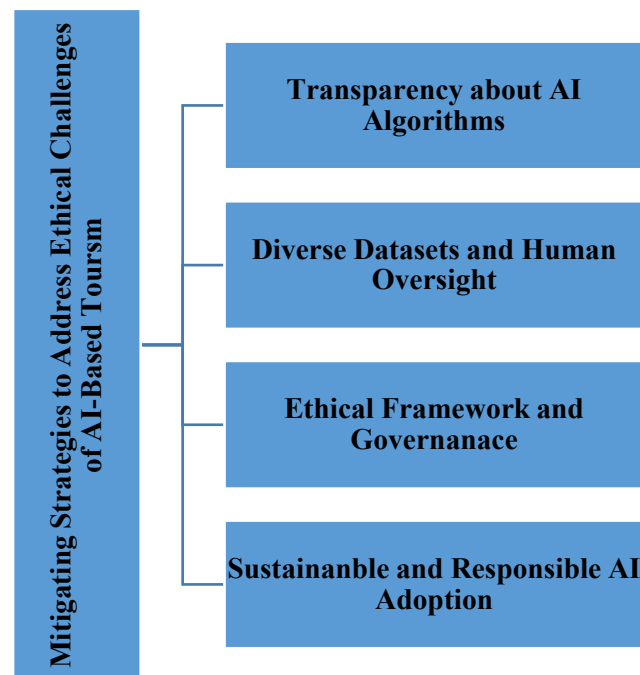
#### ***Ethical Frameworks and Governance***

The ethical standards and guidelines suggested to mitigate these biases would ensure ethical AI systems to be fair as well as inclusive (Tee, 2024; Law et al., 2024). The third area of study provides suggestions for ethics and ethics management and governance. The tourism business lacks any existing framework of AI governance and therefore requires a lot of ethical reasoning. Establishing ethical standards and specific sector guidelines is important to promote responsible adoption of AI in tourism (Binesh and Syah, 2025; Law et al., 2024). In order to develop AI implementation in a responsible, context-specific and inclusive manner, joint cooperation among key factors such as policy-makers, industry actors, and researchers are required (Chang, 2025; Andrianto et al., 2025).

#### ***Sustainable and Responsible AI Adoption***

AI has the potential for contributing greatly in the area of sustainable tourism practices. It can contribute to better resource conservation, and environmental monitoring. Nonetheless, its adoption has to be consistent with ethical and sustainable principles in order to guarantee future benefits (Chang, 2025; Kaakandikar et al., 2025). Sustainability education and responsible travel choice are paramount in AI integration into tourism as there should be an emphasis on promoting sustainable and eco-friendly tourism as well as socially responsible (Kaakandikar et al., 2025). Figure 5 shows the four mitigation

strategies to address the ethical challenges of AI-based tourism.



**Figure 5.** Addressed Ethical Consideration of AI-Based Tourism

Source: Author Own Contribution

AI can drastically transform tourism, but its deployment must be cautiously employed because of ethical considerations arising and technological challenges confronting the industry. Therefore, innovating with ethical aspects is key in order to make AI-enabled innovations work for all stakeholders while being used in a more inclusive and sustainable tourism ecosystem. To implement such ethical frameworks and governance systems, policymakers, industry stakeholders, and researchers will need to work together to create those ethical mechanisms that promote responsible AI usage in tourism.

### Conclusion

With AI applications of personalization and VR, the tourism industry is being revolutionized by AI, by virtualized and personalized trips for tourists. AI incorporated into VR and AR is altering the way tourists experience destinations where they can interact and provide virtual travel, providing immersive, participative eco-friendlier experiences where they can leave traces from experiences that are environmentally friendly and immersive. At the same time, as tourists can

move through cultural and natural sites without the constraints of physical presence, these technologies are reducing the footprint on the environment, which eventually saves resources. AI and immersive technology are helping to bring a new era of tourism with increased individualization; access and sustainability. VR and AR become tools to surround individuals with some tourist sites: they allow them to virtually experience the attractions, provide previews, and provide interactive storytelling allowing them to experience the experiences that further enrich tourists' exploration. They share historical context and cultural insights that enrich the overall experience and deepen the educational experience. Tourists receive personalized recommendations or are able to make adaptive travel plans in real-time using AI technologies. Machine learning algorithms that can assist in making predictions of user preferences is essential so that they can curate experiences and ensure every travel is really just another person travel experience you will have never seen before. In addition, such personalization encompasses seamless translations as one individual interprets the content as part of the experience, and real-

time navigation with the new and evolving language, as it is becoming to travel easier or more entertaining for segments of the community. AI in virtual tourism solutions strike a balance between an experience of tourists and sustainability for ecosystem conservation. The predictions and forecasting from AI will help to guarantee the not overcrowding of tourists while sparing the resources of nature. This approach not only enhances the visitor experience, but also allows the cultural and natural heritage to be preserved. AI and tech like ChatGPT and 360 VR videos combine to form emotional bonds between people and places. They can generate dialog and immersion, emotionally engaging and satisfying people, which leads to informed and more successful travel choice decisions. Such systems, for example, the Insight Explorer, use AI and audio AR technology to make the narrated auditory world immersive through innovative spatial sound processing to increase user engagement.

The technology offers a new way of approaching the tourism experience of visiting, visiting and cultural spaces, enabling the participation and interest of those visiting. While there are several advantages of AI and immersive technologies, issues still remain related to accessibility, authenticity, and computational complexity. Making these technologies open to all tourists is a crucial part of this work. Additionally, all relevant to all stakeholders, ethical concerns like privacy and the security of data need to be

addressed so we can ensure that these technologies are used ethically and help everybody. In conclusion, AI immersive tourism technologies have opened new possibilities of transforming tourism; in one stroke. Nonetheless, there remain some challenges attached to these technologies that should not be ignored if these are to be integrated with the ethical considerations on these technologies for them to be implemented ethically and responsibly. The future of the tourism sector will be built around the integration of AI and immersive experiences – not of tourists alone, but of a wider range of experiences. Thus this chapter examines AI-driven touristic experience by exploring how AI-driven applications could potentially play a role in sustainability in promoting immersive tourist experience, and improve visitor's experiences. It will also investigate the ethical side to implementing AI to personalize interactive tourism experiences. Lastly, methods of handling the ethical concerns of AI tourism in this chapter are discussed. For ethical consideration of AI-driven tourism, this chapter has highlighted that to mitigate the ethical issues related to AI-driven tourism, the focus should be placed on data privacy, consent, use of diverse data to eliminate bias, and transparency in AI use. Tools such as retaining human control to prevent the loss of jobs, integrating sustainable AI to reduce adverse effects on the environment and creating regulations like GDPR for the safety of user information are considered strategies.

## References

- Absalamova, G., Shukhrat, K., Absalamova, D., Farangiz, T., & Farangiz, N. (2025). A Personalized Tourism Recommendation Framework Based on Artificial Intelligence and Multi-Modal Data Fusion. *Fusion: Practice & Applications*, 20(1).
- Aldayel, M., Al-Nafjan, A., Al-Nuwaiser, W. M., Alrehaili, G., & Alyahya, G. (2023). Collaborative filtering-based recommendation systems for touristic businesses, attractions, and destinations. *Electronics*, 12(19), 4047.
- Andrianto, T., Rafdinal, W., Leo, G., & Gaffar, M. R. (2025). When Artificial Intelligence meets performances: a performance model of tourism destinations powered by AI-insights from Indonesia. *International Journal of Tourism Cities*, 11(3-4), 412-431.
- Andrianto, T., Rafdinal, W., Leo, G., & Gaffar, M. R. (2025). When Artificial Intelligence meets performances: a performance model of tourism destinations powered by AI-insights from Indonesia. *International Journal of Tourism Cities*, 11(3-4), 412-431.



- Arreeras, T., Arimura, M., Asada, T., & Arreeras, S. (2019). Association rule mining tourist-attractive destinations for the sustainable development of a large tourism area in Hokkaido using Wi-Fi tracking data. *Sustainability*, 11(14), 3967.
- Badouch, M., Boutaounte, M., Mahmoud, H., & Elmobark, N. (2025). AI-Powered Smart Tourism Reimagining Travel. In *The Role of Artificial Intelligence in Advancing Applied Life Sciences* (pp. 431-464). IGI Global Scientific Publishing.
- Bhardwaj, M., Kumar, P., & Singh, A. (2025). Bibliometric review of digital transformation in agriculture: innovations, trends and sustainable futures. *Journal of Agribusiness in Developing and Emerging Economies*.
- Bhardwaj, Sushil, Indu Sharma, Gurpreet Kaur, and Surbhi Sharma. "Personalization in Tourism Marketing Based on Leveraging User-Generated Content With AI Recommender Systems." In *Redefining Tourism With AI and the Metaverse*, pp. 317-346. IGI Global Scientific Publishing, 2025.
- Binesh, N., & Syah, A. M. (2025). AI Ethics in Hospitality and Tourism: Theoretical Perspectives, Ethical Beliefs, and Actionable Outcomes. *OSF Preprints*, (akf4z\_v1).
- Brayan Clark and Fangfang Lee (2026). What is gradient boosting? Retrieved 23 January, 2026 from <https://www.ibm.com/think/topics/gradient-boosting>. Last accessed on 23 January, 2026.
- Burlov, D., Iakovlev, A., & Kamenskikh, E. (2024). Study Of The Potential Of The Leningrad Region For The Development Of Health Resort Treatment: Natural Resources, Climatic Conditions And Tourist Infrastructure.
- Chandrasekaran, S., & RV, S. (2025). Artificial Intelligence in Tourism: An Enhanced Tourist Journey Framework. *Tourism Review International*, 29(2), 151-170.
- Chang, J., Wang, H., Su, W., He, X., & Tan, M. (2025). Artificial intelligence in food bioactive peptides screening: Recent advances and future prospects. *Trends in Food Science & Technology*, 156, 104845.
- Chang, K. Y. (2025). When travel agencies entrust AI with data: the role of knowledge-based dynamic capabilities in marketing innovation. *Journal of Travel & Tourism Marketing*, 42(6), 864-879.
- Chen, J. (2024). Analysis of rural tourism culture advertising content based on LSTM-CNN model. *Applied Mathematics and Nonlinear Sciences*, 9(1), 8.
- Chirag Bhardwaj (2025). AI in Travel: Revolutionizing safety and seamless journeys. Retrieved 30 January, 2026 from <https://appinventiv.com/blog/ai-in-travel/>.
- Christodoulou, E., Gregoriades, A., Pampaka, M., & Herodotou, H. (2020, May). Combination of topic modelling and decision tree classification for tourist destination marketing. In *International conference on advanced information systems engineering* (pp. 95-108). Cham: Springer International Publishing.
- Dung Tran (2025). AI in Travel: Top Use Cases You Need To Know. Retrieved 23 January 2026 from <https://smartdev.com/ai-use-cases-in-travel>.
- Darraz, N., Karabila, I., El-Ansari, A., Alami, N., & El Mallahi, M. (2025). Enhancing recommendation systems with collaborative filtering and sentiment analysis: dimensionality reduction for improved content-based approaches. *Knowledge and Information Systems*, 1-35.
- Das, J. (2024). IoT-enabled smart city governance using AI-based data analytics. *Metaversalize*, 1(1), 1-15.
- Doğan, S., & Niyet, İ. Z. (2024). Artificial intelligence (AI) in tourism. In *Future Tourism Trends Volume 2: Technology Advancement, Trends and Innovations for the Future in Tourism* (pp. 3-21). Emerald Publishing Limited.
- Esfandiar, K., Bapiri, J., & Kuhzady, S. (2024). The impact of the sharing economy on tourism microentrepreneurship. In *Handbook of Tourism Entrepreneurship* (pp. 384-398). Edward Elgar Publishing.
- Eswaran, U., Eswaran, V., & Eswaran, V. (2025). AI technologies for personalised and sustainable tourism. *AI Technologies for Personalized and Sustainable Tourism*, 1-30.
- Farheen, N. S., Badiger, C. S., Kishore, L., Dheeraj, V., & Rajendran, S. R. (2024). A future look at artificial intelligence in the world of tourism. In *Marketing and big data analytics in tourism and events* (pp. 1-16). IGI Global Scientific Publishing.

- Ferhataj, A., & Memaj, F. (2024). Challenges And Opportunities Of Ai Implementation In Tourism: An Ethical And Technological Perspective. *STUDIJS–VERSLAS–VISUOMENĖ: DABARTIS IR ATEITIES JŲVALGOS*, 1(IX), 217-231.
- Florido-Benítez, L., & del Alcázar Martínez, B. (2024). How artificial intelligence (AI) is powering new tourism marketing and the future agenda for smart tourist destinations. *Electronics*, 13(21), 4151.
- Forouzandeh, S., Rostami, M., & Berahmand, K. (2022). A hybrid method for recommendation systems based on tourism with an evolutionary algorithm and topsis model. *Fuzzy Information and Engineering*, 14(1), 26-50.
- Gajdošík, T., & Marciš, M. (2019, April). Artificial intelligence tools for smart tourism development. In *Computer Science On-line Conference* (pp. 392-402). Cham: Springer International Publishing.
- Goel, R. K., & Nelson, M. A. (2025). Awareness of artificial intelligence: Diffusion of AI versus ChatGPT information with implications for entrepreneurship. *The Journal of Technology Transfer*, 50(1), 96-113.
- Goyal, A., Kumar, A., Mishra, P., Ray, A., Mishra, S., & Mishra, U. S. (2025). Eco-Tourism Attitudes as Drivers of Environmentally Sustainable Tourism Development: A Mediation Study. *International Journal of Environmental Sciences*, 114-124.
- Hammad, A. A., & Abd El Maksoud, R. M. (2025). Leveraging Experiential Marketing for Boosting Tourists' Engagement in the Egyptian Tourist Destination. *The International Journal of Tourism and Hospitality Studies*, 8(2), 48-70.
- Hu, G. (2025). An integration of random forest regression model in tourism suitability evaluation index system. *Intelligent Decision Technologies*, 19(3), 1477-1493.
- Hu, J., & Lin, B. (2025). What is next for travel innovation? Generative Artificial Intelligence (GAI) in tourism product development from multi-perspectives. *Asia Pacific Journal of Tourism Research*, 1-20.
- Huang, A., Ozturk, A. B., Zhang, T., de la Mora Velasco, E., & Haney, A. (2024). Unpacking AI for hospitality and tourism services: Exploring the role of perceived enjoyment on future use intentions. *International Journal of Hospitality Management*, 119, 103693.
- Ioannou, A., Tussyadiah, I., & Lu, Y. (2020). Privacy concerns and disclosure of biometric and behavioral data for travel. *International Journal of Information Management*, 54, 102122.
- Jiang, T., Jiang, C., & Xie, N. (2025). Explore sustainable practices in landscape construction and enhance the environmental and cultural sustainability of characteristic towns. *GeoJournal*, 90(4), 1-14.
- Kaakandikar, R. M., Patel, Y., & Tripathy, L. (2025). Sustainability and Ethical Tourism in the Digital Age: Harnessing AI and the Metaverse. In *Redefining Tourism With AI and the Metaverse* (pp. 123-162). IGI Global Scientific Publishing.
- Kaya, S. N., Genç, L., & Kozak, M. (2025). Determination of sustainable areas for ecotourism using GIS-based AHP. *International Journal of Tourism Cities*, 11(3-4), 393-411.
- Khan, N., Khan, W., Humayun, M., & Naz, A. (2024). Unlocking the potential: Artificial intelligence applications in sustainable tourism. *The role of artificial intelligence in regenerative tourism and green destinations*, 303-316.
- Kumar, D., & Ratten, V. (2025). Artificial intelligence and family businesses: a systematic literature review. *Journal of Family Business Management*, 15(2), 373-392.
- Kumar, D., Shandilya, A. K., & Kumar, S. (2024). Artificial Intelligence Adoption in Hospitality and Tourism: A Science Mapping Approach. *Global Journal of Business Social Sciences Review (GATR-GJBSSR)*, 12(4).
- Lalitha, E., Ramani, K., Shahida, D., Deepak, E. V. S., Bindu, M. H., & Shaikshavali, D. (2023, May). Text summarization of medical documents using abstractive techniques. In *2023 2nd International Conference on Applied Artificial Intelligence and Computing (ICAAIC)* (pp. 939-943). IEEE.
- Law, R., Lin, K. J., Ye, H., & Fong, D. K. C. (2024). Artificial intelligence research in hospitality: a state-of-the-art review and future directions. *International Journal of Contemporary Hospitality Management*, 36(6), 2049-2068.
- Li, Y., & Cao, H. (2018). Prediction for tourism flow based on LSTM neural network. *Procedia Computer Science*, 129, 277-283.

- Liu, W., Wu, L., & Zhao, H. (2026). Improving sentiment analysis in tourism through LLM-enhanced irony detection. *Tourism Management*, 112, 105272.
- López-Naranjo, A. L., Puente-Riofrio, M. I., Carrasco-Salazar, V. A., Erazo-Rodríguez, J. D., & Buñay-Guisñan, P. A. (2025). Artificial intelligence in the tourism business: a systematic review. *Frontiers in Artificial Intelligence*, 8, 1599391.
- Manos, A., Filippidou, E., Pavlidis, N., Vachtanidis, G., Karanasios, G., Mallidis, I., ... & Ayfantopoulou, G. (2024, December). A real world case study on sales prediction using Artificial Intelligence. In *Proceedings of the 28th Pan-Hellenic Conference on Progress in Computing and Informatics* (pp. 231-236).
- Max Liul (2026). AI in Tourism Industry: Main Examples & Benefits for 2026. Retrieved 22 January, 2026. From <https://integro.net/blog/benefits-of-ai-in-tourism>.
- Meng, L. (2024). The convolutional neural network text classification algorithm in the information management of smart tourism based on internet of things. *IEEE Access*, 12, 3570-3580.
- Mihai Gabriel, C. R. I. S. T. I. A. N., & Cosmin, T. I. L. E. A. G. Ă. (2024). Challenges and perspectives of AI in sustainable tourism. *Management of Sustainable Development*, 16(2).
- Octal IT Solution LLP (2025). AI in Tourism Industry: Key Trends, Use Cases & Benefits in 2025. Retrieved 22 January, 2026 from <https://www.octalsoftware.com/blog/ai-in-tourism-industry>.
- Pai, P. F., Wei-Chiang, H., Ping-Teng, C., & Chen-Tung, C. (2006). The application of support vector machines to forecast tourist arrivals in Barbados: An empirical study. *International Journal of Management*, 23(2), 375.
- Panigrahy, A., & Verma, A. (2025). Bane or Boon?: Metaverse for the Tourism Sector. In *Redefining Tourism With AI and the Metaverse* (pp. 189-220). IGI Global Scientific Publishing.
- Panigrahy, A., & Verma, A. (2025). Tourist experiences: a systematic literature review of computer vision technologies in smart destination visits. *Journal of Tourism Futures*, 11(2), 187-202.
- Patni, R., & Raut, S. (2025). Enhancing Experiences: The Integration of AI in Augmented and Virtual Reality. In *Impact of AI and the Evolution of Future Ghost Kitchens* (pp. 197-208). IGI Global Scientific Publishing.
- Pensiri, F., Visutsak, P., & Chaowalit, O. (2022, June). Clustering tourist using DBSCAN algorithm. In *AIP Conference Proceedings* (Vol. 2471, No. 1, p. 020002). AIP Publishing LLC.
- Pero-Gascon, R., Benavente, F., Minic, Z., Berezovski, M. V., & Sanz-Nebot, V. (2019). On-line aptamer affinity solid-phase extraction capillary electrophoresis-mass spectrometry for the analysis of blood  $\alpha$ -synuclein. *Analytical Chemistry*, 92(1), 1525-1533.
- Pullolla Panidhar (2023). Machine Learning Uses in Travel and Tourism. Retrieved 23 January, 2026 from <https://medium.com/@pullollapanidhar/machine-learning-uses-in-travel-and-tourism-bb636c4a11c8>.
- Saleh, M. I. (2025). Generative artificial intelligence in hospitality and tourism: future capabilities, AI prompts and real-world applications. *Journal of Hospitality Marketing & Management*, 34(4), 467-498.
- Sánchez, C., Larenas, F., Arroyave, J. S., Connors, C., Giménez, B., Palese, M. A., & Fulla, J. (2024). Artificial intelligence in urology: application of a machine learning model to predict the risk of urolithiasis in a general population. *Journal of Endourology*, 38(8), 712-718.
- Schiffmann, M., & Richert, A. (2024, August). Evaluation of Social Robots with Social Signals in Public Spaces. In *2024 33rd IEEE International Conference on Robot and Human Interactive Communication (ROMAN)* (pp. 56-61). IEEE.
- Sharma, V. (2024). AI in hospitality and tourism promotion: Opportunities and challenges. *Impact of AI and tech-driven solutions in hospitality and tourism*, 43-65.
- Singh, A. (2025). Convergence of generative artificial intelligence (AI)-based applications in the hospitality and tourism industry. In *Generative artificial intelligence and ethics: Standards, guidelines, and best practices* (pp. 127-142). IGI Global.
- Singh, B., & Kaunert, C. (2025). Featuring healthcare, environment, and human rights: Applications of artificial intelligence in the health domain. In *Gender, Environment, and Human Rights: An Intersectional Exploration* (pp. 45-74). IGI Global.

- Singh, B., Kaunert, C., Malviya, R., Gautam, R., & Singh, G. (2024). Generative Artificial Intelligence in the Tourism-Hospitality Industry: Strengthening Customer Relationships, Delivering Better Experiences. In *Hotel and Travel Management in the AI Era* (pp. 275-300). IGI Global Scientific Publishing.
- Singh, P., & Singh, V. (2024). The power of AI: enhancing customer loyalty through satisfaction and efficiency. *Cogent Business & Management*, 11(1), 2326107.
- Srinivasan, S., SHerkar, A., Jayamani, J., Indora, A., & Mukherjee, R. (2024). Tourism innovation and the role of technology in enhancing visitor experiences. *Educational Administration: Theory and Practice*, 30(4), 1506-1513.
- Tahmi, S., Rui, X., & Guechi, I. (2026). Modeling and evaluation of urban growth: a comparative approach between XGBoost and deep neural networks coupled with multi-criteria analysis: case of BouSaâda, Algeria. *Modeling Earth Systems and Environment*, 12(1), 37.
- Talakoti, M., BalaRam, A., Jagli, D., Deepika, N., Priya, R. L., & Harshini, K. (2025). Trip Tailor: AI-Powered Travel Planning with Itinerary Generation and Chatbot Assistance. *International Journal of Environmental Sciences*, 11(4s), 920-929.
- Talukder, M. B., Khan, M. R., Kumar, S., Singh, K., & Lina, F. Y. (2025). AI Strategies for Tourism Development in Emerging Markets. In *Practical Strategies and Case Studies for Online Marketing 6.0* (pp. 117-138). IGI Global Scientific Publishing.
- Tee, M. K. A. (2024). Malaysia's Smart. *Utilizing Smart Technology and AI in Hybrid Tourism and Hospitality*, 51.
- Tiwari, A., Singh, R. K., & Shigwan, S. J. (2024). SwinDTI: swin transformer-based generalized fast estimation of diffusion tensor parameters from sparse data. *Neural Computing and Applications*, 36(6), 3179-3196.
- Traversa, G. (2024). L'attenzione ai tempi. *Ricerca & Pratica*, 40(5), 207-207.
- Varghese, B., & Pratyusha, Y. B. (2024). Smart Digital Applications for New Age Tourism: Role of Transformational Digital Culture and Artificial intelligence. In *New Strategy Models in Digital Entrepreneurship* (pp. 172-185). IGI Global.
- Xiao, Z., Liu, C., Luo, S., Huang, K., Gao, H., Xu, X., & Wang, X. (2023). A collaborative and dynamic multi-source single-destination navigation algorithm for smart cities. *Sustainable Energy Technologies and Assessments*, 56, 103032.
- Yoon, J., & Choi, C. (2023). Real-time context-aware recommendation system for tourism. *Sensors*, 23(7), 3679.
- Yoon, S., Shin, H., & Choi, J. (2026). Regulatory Fit in Explainable AI-Based Recommendations: A Comparative Study of Personalized Explanation Strategies on User Experience and Persuasion. *International Journal of Human-Computer Interaction*, 1-35.
- Zhang, B., Zhu, Y., Deng, J., Zheng, W., Liu, Y., Wang, C., & Zeng, R. (2023). "I am here to assist your tourism": Predicting continuance intention to use AI-based chatbots for tourism. Does gender really matter? *International Journal of Human-Computer Interaction*, 39(9), 1887-1903.
- Zhang, X., & Wang, S. (2025, April). K-Means Clustering-based Recommendation System for Enhancing Village Folk Tourism. In *2025 4th International Conference on Distributed Computing and Electrical Circuits and Electronics (ICDCECE)* (pp. 1-8). IEEE.