

A Study on Influence of AI and Internet of Things on Smart Tourism Destination

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Abstract

In this research, the proposed solution is to apply Artificial Intelligence (AI) and the Internet of Things (IoT) in an attempt to modernize Smart Tourism Destinations (STDs). The synergy between the Internet of Things and the concepts of artificial intelligence is an unmatched gain to the sphere of tourism in numerous aspects, such as individual recommendations, access to information in real-time, etc. This was planned to conduct a deep investigation of the present state, issues and future of the STDs in the artificial intelligence and internet of things synergy. The paper starts to identify various AI methods besides data collection processes that can be provided by IoT and improve the quality of tourist experience and the process of destination management. Nonetheless, it is highly important to resolve these issues in regard to privacy and data security. Its core competence is to become the pioneer in provision of smart and people centric tourism destinations. The paper outlines the influence of AI-based technologies on Smart Tourism Destination, as well as returns to the necessity to study the ethical issues, quality of data, understandability, and collaboration between people and artificial intelligence.

Keywords: Artificial Intelligence, Internet of Things, Smart Tourism Destinations, Traveler Experience.

Introduction

A Smart Tourism Destination (STD) is a tourist destination, which has digitally deployed various innovative technologies by developing a strategic business model to boost tourists satisfaction, enhance efficiency in destination development management, and support sustainable growth. As the information and communication technologies (ICT) rapidly develop, the tourism destinations are no longer traditional destinations; they are becoming technology-driven data-driven ecosystems. Smart Tourism Destinations (STDs) refer to tourism settings which make use of digital technologies to promote visitor experiences, streamline management of the destination, and enhance operational efficiency.

Two of the road-opening technology processes are:

- Artificial Intelligence (AI): Support predictive analytics, customized services, automation, and smart decision support.

- Internet of Things (IoT): Gives great real-time data through the sensors and the connected devices used to facilitate monitoring services, resource management, and context-sensitive services.

These technologies combined will make ordinary tourism practices data-driven and smart ecosystems; thus, the goal of the research is to offer an in-depth review of how AI and IoT could be used to make tourist destinations smarter. Through discovering the different uses and connotations of these two technologies, we would be able to establish a clear picture of the present state, the challenges, and the future of STDs with regard to the integration of AI and IoT. Moreover, we aim at determining some of the important strategies and technologies that can be used in making smarter, visitor oriented tourism destinations. We will use a systematic review to assess existing literature, the industry, and case studies to show a comprehensive overview of the opportunities and concerns related to the use of AI and IoT within the framework of STDs, covering machine learning, natural language processing, and image recognition, which may be used to enhance the experience of travellers and provide them with the opportunity of individual choices. Moreover, IoT-enabled data collection mechanisms such as real-time environmental monitoring, transport optimization, and visitor attendance tracking, which can make a significant contribution to the management of destinations and their management effectiveness, will be also studied. Nonetheless, there are some issues when it comes to the AI and IoT implementation in STDs. Some of the key challenges that must be addressed are: privacy and data security concerns, complicated system integration and the fact that extensive technology guarantees and must be implemented. We will explain these challenges further into insights into how one can overcome them with regard to possible solutions and best practices.

Literature Review

Smart Tourism Destinations

The character of tourism destinations as smart is not only founded on the knowledge of some applications through the use of technology. Smartness can also be described as a method of management of tourism shifted towards the locality and new opportunities created through the use of technology. A smart tourism destination is a geographical region where the development of the tourism industry is verified in accordance with the technological infrastructures, allowing to optimise the quality of tourists experience, improve the quality of life of local locality, and quantify sustainable development (Shafiee et al., 2022). To validate smartness, the integration of information regarding local resources, tourist behaviour and habits, and optimal application of the technological platforms to service the stakeholders with the resulting knowledge is necessary (Buonincontri and Micera, 2016). When the integration is created, working with the resources of the end point at macro and micro scales are better and contribute to creating real-time tourism experiences (Buhalis and Amaranggana, 2013).

It is important in smart tourism destinations to ensure that the knowledge and technology is passed by means of technological advancements, develop new applications, and establish digital areas of activity. As an example, the use of ICTs like cloud services and the IoT can provide the necessary framework of the development of destinations (Liberato et al., 2018). Nevertheless, to create an intelligent tourism destination, involvement of ICTs will not be sufficient. Humancapital, leadership, social capital, and innovation should be measured attentively in this background (Boes et al., 2014).

Artificial Intelligence

The topic of Artificial Intelligence (AI) is researched and studied with a wide focus, and various facets of this disruptive technology are left in a transparent case of examination by scientists. Shifting

to artificial intelligence research, as the instrument that puts the boundaries on what machines can do, whether that can be perception, thinking, or making meaningful decisions (M. Woschank, 2020). The researchers in the field of AI are conducting investigations on the capability to discover solutions to make the machine learning algorithms more precise and effective. They are looking at new techniques and ways, which could handle large amounts of data, give them the most generalization as well as improve the clarity of AI engines. Furthermore, researchers also aim at new types of AI algorithms, that can think on the basis of small ranges of data, or alter their surroundings, so that machines can constantly advance their work, as time passes (H. Benbya, 2021).

Internet of Things

Internet of things (IoT) is described as a network of interconnected bodily instruments (things) that supply sensors, software, and communication platforms in an attempt to constitute and transmit data through the Internet. The theory was invented based on the studies that Kevin Ashton undertook in the late nineties that focused on linking physical things to digital world. Sensemaking Since that time IoT has evolved into an interdisciplinary subject that includes computing, communication, automation and data analytics

Role of AI in Smart Tourism Destinations

Personalization and Experience Enhancement

Improvement of Personalization and Enhancement of Experience. With the assistance of AI, systems allow analyzing gigantic amounts of information and providing individualized recommendations, forecasts, and language services. Travelers receive modified experiences that are tailored to their tastes to enhance satisfaction and interest.

Example: The AI may customize the schedules on the basis of tourist behaviour, enhancing satisfaction due to the matching of services to personal needs.

Predictive Analytics & Decision Support

The AI algorithms are used to measure the behaviour and patterns of tourists and allow:

- Visitor flow estimation
- Resource allocation
- Real time dynamic service adjustments.

These competences will enable a destination manager to make informed decisions.

Automation & Intelligent Services

- Chatbots to engage customers.
- Smart ticketing and navigation.
- Customer service robotics.

This saves on operation and enhances ease of work by the tourists.

Role of IoT in Smart Tourism Destinations

Real-Time Monitoring & Data Collection

To identify the current status and formulate the appropriate plan, real-time monitoring and data collection are needed (Bond, 2013). The IoT sensors are arranged in locations and attractions to enable data to be continuously gathered like:

- Visitor attendance
- Environmental conditions
- Infrastructure usage

This has the benefit of providing real-time situational awareness and more prompt responses to operational activities.

Operational Efficiency

IoT Supports

- Mob flow management
- Energy optimization
- Asset tracking

These skills help reduce the expenditure and maintain the quality of services.

Enhanced Safety and Infrastructure Management

The IoT has the freedom to identify abnormalities (e.g., overcrowding or environmental risks) and facilitate proactive reaction of the managers through constant surveillance.

Impact on Stakeholders

Tourists

Tourism would be made more with AI and IoT technologies:

- Personalized
- Accessible
- Efficient
- Engaging Since services are dynamic to the needs of visitors, the satisfaction of the visitors increases.

Destination Managers

In the case of destination governance and management, technologies are good in terms of:

- Evidence-based managerial knowledge.
- foresight in the demand and resource planning.
- Software to optimize the use of infrastructure and flow of visitors.

Industry & Sustainability

AI and IoT can support:

- Reduced energy consumption
- Environmental monitoring
- Better sustainable tourism.

These advances assist in streamlining tourism to environmental and sustainability objectives.

Challenges

The use of AI and IoT in smart tourism destinations propose enhanced personalization and efficiency, but it is imperative because of data privacy, high costs of infrastructure, and the complicated system integration. The following are further barriers which are taken too seriously: cybersecurity threats, digital divide in respect to small businesses, ethical concerns such as algorithmic bias and human touch which could be lost in the processes.

Key Challenges of AI and IoT in Smart Tourism Destination

- **Data Security and Privacy Concerns:** The intensity of personal data gathering by AI systems and IoT devices is significant, so it is important to raise an important risk associated with user privacy, data illicitness, and the necessity to ensure high safety levels.

- High Investment and Implementation Costs: Introducing the required, powerful technological infrastructure (e.g. sensors, 5G, data centers) is a costly matter that might become a barrier to smaller destinations or businesses
- System Integration and Complexity: System Integration and Complexity Long-run Integrating different IoT sensors, AI algorithms, and some models of real legacy systems forms technical complexity and the inability to easily integrate them.
- Digital Divide and Inequality: Bigger businesses and less developed areas might be unable to implement these technologies which further separates them and with bigger competitors that understand the technology.
- Ethical and Algorithmic Bias: The AI systems will unknowingly show biases in their suggestions, and therefore will treat tourist who are eliminating authentic, customized, or local residues differently.
- Job Displacement and Workforce Changes: Job Displacement and Workforce Changes: Workforce management is facilitated by the trend towards automation, including chatbots and robotic services, which causes jobs to disappear.
- Technical Reliability and Infrastructure: Dependence on continuous internet connectivity and stable power supplies for IoT devices can lead to vulnerabilities in service delivery.
- Loss of Human Touch: Synonymously, I am worried that without human interaction, the feeling of the human touch could be lost because of overutilization of AI-driven services in favor of personalized hospitality which tourism traditionally entails.

Conclusion

The research has enhanced smart tourism destinations with the use of artificial intelligence (AI) and the Internet of Things (IoT) have suggested the remarkable possibility of these technologies to reshape the tourism sector. Through the intersection of the capabilities of AI and IoT, the smart tourism destination (STD) can deliver a personalized and interactive experience to tourists, increase the efficiency of operations and enhance the overall destination organization. The research assists in enhancing various uses and futures of AI and IoT in terms of Smart Tourist Destinations. The combination of AI and IoT technologies make STDs gather and analyse enormous data volumes, convert strong valuable visions into customer preferences, behaviours and trends. One can use this information to provide personalized recommendations, allocate resources in a more efficient way, and enhance the visitor experience. Machine learning, natural language processing, and computer vision are the techniques that render the experience of traveling more valuable and allow offering special offers based on individual preferences. In addition to this, data gathering systems fueled by the IoT, such as real-time measurements of the environment and optimization of transportation, constructively form destination management and operability.

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