

Analysis of the Implementation of Artificial Intelligence (AI) in the Retail Sector

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Abstract: Artificial intelligence (AI) is quickly transforming the retail sector by automating numerous operations that were previously time-consuming and required a lot of manual labor, which are essential for running a profitable business. AI applications in the retail industry can assist organizations in determining the most effective pricing strategies by offering visual representations of the potential effects of various pricing methods. To do this, systems gather information on different items, advertising campaigns, sales numbers, and other pertinent data.

There is currently a growing use of Artificial Intelligence (AI) and Machine Learning (ML) terms in the industrial sector. AI-based apps are being utilized more frequently by retailers. The aim of this study is to gain a more profound understanding of artificial intelligence (AI), its emerging applications in the retail industry, and to choose the most advantageous path for future research in this field. Retailers are increasingly incorporating artificial intelligence (AI) into several aspects of their retail operations, as stated in the study. Moreover, a substantial fraction of retail businesses are integrating artificial intelligence (AI) into their operational plans. Artificial intelligence (AI) is highly advantageous in the retail sector in India, namely for operations like order processing, shipping, and inventory management.

Keywords: Artificial Intelligence, Machine Learning, Retailing, Store management

I. INTRODUCTION

In order to remain competitive in the current global economy, retail businesses must place a high importance on maximizing profit and productivity. In order to ensure success and maintain a competitive edge, it is crucial to act promptly and effectively. Artificial intelligence (AI) can enhance retailers' profitability and streamline corporate operations. Survival in today's market is only possible for shops who employ ingenuity and utilize the most advanced technologies. Artificial intelligence (AI), big data analytics (BDA), and machine learning (ML) are anticipated to profoundly transform all aspects of human life, representing three major technical developments. McCarthy (1998) defines artificial intelligence (AI) as the field of study and application of constructing intelligent machines, specifically intelligent computer programs. The AI system acquires and analyses data in an ongoing manner to continually learn and resolve problems in a dynamic environment (Cao, 2021). Artificial intelligence (AI) is a technological discipline that utilizes datasets to collect data and information, enabling the replication of repetitive patterns and behaviours. AI's ability to autonomously accomplish tasks has transformed it into an indispensable requirement for human survival. Artificial intelligence affects various industries, such as telecommunications, education, healthcare, entertainment, retail, transportation, and hospitality. AI App Development has become pervasive across several aspects of everyday life. The genesis of artificial intelligence (AI) lies in the objective of developing machines capable of completely or partially substituting humans in specialized tasks. The epidemic has expedited the adoption of technology in the worldwide retail industry. The objective of this study is to explore the possible applications of artificial intelligence in the retail industry, as well as identify future areas for research.

II. RESEARCH OBJECTIVES

To ascertain the primary domains in which AI is being employed within the retail industry.

To examine the artificial intelligence systems utilized in the retail industry.

To understand the current status of research on artificial intelligence (AI) and its prospective implementations in the retail industry.

III. METHODOLOGY

The current body of research on this subject is found by searching for terms like artificial intelligence, marketing, and retailing. The research utilized databases such as Web of Science, Scopus, and other repositories that house published literature on artificial intelligence. When conducting research on the applications of AI in retail, it is common to refer to reports and datasets provided by the industry. Content analysis, a conventional approach, is utilized to comprehend the novel application of artificial intelligence (AI) in the retail industry.

The application of artificial intelligence in the retail industry

Artificial intelligence (AI) is utilized in various important aspects of the retail industry, including customer services, store management, supply chain management, media optimization, online risk management, omnichannel and mobile consumer behaviour monitoring, and other applications.

Customer Service

Artificial intelligence (AI) is fulfilling several functions in customer care, encompassing both online and brick-and-mortar retail environments. AI-powered solutions have been developed for many objectives, such as advertising, automation, and digitizing point-of-sale systems. Amazon Go shop in Seattle utilizes computer vision, sensor fusion, and deep learning in their automated self-checkout systems (Ruschen and Wiehenbrauk, 2017). Bertacchini et al. (2017) found that employing robotic technology can enhance employee welfare, reduce labour expenses, offer clients prompt and knowledgeable advice, and increase sales. Lowe's, a home improvement company situated in the United States, employs robots to assist with sales (Forgan, 2020). Online chatbots are utilized for assisting clients in placing orders, providing additional services, and offering customer care (Christie, 2018). Lidl, a supermarket headquartered in the UK, has launched Margot, an AI-driven chatbot on Facebook Messenger. Margot assists users in selecting the perfect wine depending on their preferences and financial constraints. Syam and Sharma (2018) state that machine learning algorithms can provide tailored purchase experiences and virtual assistants that improve communication between customers and retailers. Shankar (2018) states that Coversica is an artificial intelligence (AI) tool designed to facilitate communication with potential clients and improve the connection between customers and retailers.

Store management

Store management is a crucial component of the retail industry. AI-driven humanoid robots have the ability to guide consumers within stores and assist them in finding the specific things they wish to purchase.

Pepper, a humanoid robot, provides client assistance in Ave and Softbank mobile stores (Shankar, 2018). Retailers can ensure optimal product availability by leveraging AI-driven solutions to accurately stock their shelves with the appropriate products, in the correct quantities, and at the right times. AI-powered visual merchandising, category management, and merchandising enable efficient management of physical stores.

Eden is a sophisticated software designed to assist store staff in accurately assessing the freshness and spoilage status of fruits and vegetables (Musani, 2018). Using the program, users can capture an image of the fruit or vegetable and obtain an assessment of its level of freshness and the amount of time it can still be stored on a shelf. This assisted the merchant in optimizing their supply chain and ensuring the quality of fruits and vegetables. Walmart utilizes this software at 43 of its distribution centers. Artificial intelligence can also be utilized to automate many retail procedures. Walmart has implemented robots specifically built to scan shelves in order to monitor and manage the inventory levels on different shelves.

Tally, a company, has developed an autonomous robot that scans for vacant spaces and misplaced items (Vanian, 2018). Lawson, a retailer, has enhanced the temperature and lighting conditions in its stores using applications based on artificial intelligence. BestBuy utilizes Alexa as a means of responding to inquiries from consumers. Therefore, it is evident that AI can assist in optimizing retail management.

Supply chain management

Supply chain management plays a crucial function in the retail industry. Artificial intelligence (AI) powered solutions are enhancing inventory management and optimizing the efficiency of the supply chain. Furthermore, it can assist in automating order processing and predicting demand. Forecasting systems can optimize supply networks. Artificial intelligence can be utilized to enhance the efficiency of the fulfilment process (Ning et al., 2009). AI-based solutions, including voice-enabled ordering systems, can also assist customers in their specific ordering procedures (Dennis, 2018 a & b). In addition, it can assist in mitigating risks in supply chains (Giannakis and Louis, 2011). Weber and Schutte (2019) suggest that artificial intelligence (AI) can be utilized to ascertain the optimal inventory levels for various warehouses, taking into account variables such as the specific warehouse location, seasonal variations, regional considerations, and prominent urban areas.

Media Optimization

Several prominent global retailers utilize artificial intelligence (AI) for the purpose of managing their social media and web platforms. Kroger is utilizing a machine learning platform called "Kroger Precision Marketing" to improve its personalized communication efforts (Davenport, 2018). The Australian online gift retailer utilizes a sophisticated digital marketing technology called Albert, which is powered by artificial intelligence. This tool enables the retailer to effectively reach and engage with potential customers on popular social media platforms such as Facebook, YouTube, and Google (Shankar, 2018). Retailers are employing artificial intelligence (AI) to specifically target prospective customers across diverse media channels and to strategize, coordinate, and supervise marketing campaigns across several online platforms.

Online Risk Assessment

Retailers operating in the omnichannel paradigm (online, brick and mortar locations) are concerned about cybersecurity concerns, including data breaches and online frauds. Applications built on artificial intelligence (AI) can enhance internet security and protect systems from unauthorized access. Furthermore, the utilization of machine learning (ML), behavioural analytics, and predictive analytics can aid in identifying irregularities, hence assisting in the detection of fraudulent activities (Cao, 2021).

Amazon use artificial intelligence (AI) to identify and flag deceptive reviews on its platform. Coop Group, a Swiss retailer, utilizes CognitoTM, a solution for detecting and monitoring cyberthreats. Artificial Intelligence (AI) can provide customers with a secure and convenient purchasing experience, particularly as digital platforms increasingly dominate the retail industry. PayPal utilized a sophisticated deep learning algorithm to identify and thwart fraudulent payments (Shankar, 2018). Amazon use artificial intelligence (AI) to identify and flag deceptive reviews on its platform. Coop Group, a Swiss retailer, utilizes CognitoTM, a solution for detecting and monitoring cyberthreats. Artificial Intelligence (AI) can provide customers with a secure and convenient purchasing experience, particularly as digital platforms increasingly dominate the retail industry. PayPal employed a deep learning system to detect and prevent instances of payment fraud (Shankar, 2018). PayPal employed a deep learning system to detect and prevent instances of payment fraud (Shankar, 2018).

Understanding the patterns of consumer behaviour across several channels and mobile devices

Artificial Intelligence (AI) is an effective tool for monitoring and analysing client journeys, as well as identifying any obstacles that customers may encounter during digital transactions. Retailers employ natural language processing and computer vision techniques to analyse customer behaviour for the purpose of enhancing the overall customer experience. The French retailer L'Occitane achieved higher sales by successfully identifying and resolving client pain points in their mobile applications (Shankar, 2018). Retailers are currently utilizing artificial intelligence (AI) and mobile data to more effectively analyse customer behaviour, thanks to the advancement of mobile applications.

Other applications

Utilizing artificial intelligence for prospecting can assist in identifying potential clients who are ready to make a purchase (Flaiz, 2019). The Uniqlo clothing retailer is currently conducting an investigation into the implementation of UMood kiosks, which utilize artificial intelligence technology to display a variety of products to customers. These

kiosks also employ neurotransmitters to assess the customers' response to different colours and styles. Dwivedi et al. (2019) state that AI apps can collect data to develop customer-specific profiles that predict their purchase tendencies.

Potential and Challenges of Artificial Intelligence in the Retail Industry

Due to the global pandemic, major businesses, including the retail industry, have embraced technology. This sector is characterized by its dynamic nature and its rapid adoption of technology. The implementation of AI technology is applicable to both online and brick-and-mortar stores. Jain and Laney (2016) predict that by 2020, advanced customization engines capable of accurately understanding consumer intentions will be developed with the purpose of increasing revenue. According to IBM (2019), a projected 85% of retail organizations want to implement supply chain automation by 2021, potentially leading to industry growth.

In order to mitigate the potential displacement caused by the increasing automation and subsequent replacement of low-skilled, monotonous shop tasks by artificial intelligence (AI), the retail industry needs to create new employment opportunities and roles (Acemoglu, Restrepo, 2018). Retailers should deploy AI technology as ethically responsible organizations that consider the welfare of consumers, employees, and society as a whole, despite the fact that AI is not intended to supplant human beings (Mahmoud et al., 2020).

An overview and discussion on the future directions of AI and retail research

According to Camberia (2016), retailers may acquire and utilize profound consumer insights through the usage of AI. Therefore, the act of collecting valuable information from consumer research and identifying the crucial factors that can enhance the purchasing process is a rapidly growing area of academic investigation. The retailer could potentially adopt automation and hyper-personalization as a consequence. AI-powered applications hold significant potential for enhancing user experiences. Conducting study on the key attributes, functionalities, and potential advantages of AI for both customers and retailers would be highly intriguing. Despite the proactive efforts of numerous establishments to create AI-based solutions, there is a scarcity of comprehensive research on the actual benefits derived from implementing these technologies. Running a store is a significant challenge that all retailers must overcome. Promising areas for future research include AI and its potential impact on item quality control, shelf management, customer assistance, product placement, and retail atmosphere management. Artificial Intelligence (AI) has extensive applications in the fields of supply chain and inventory management. Engaging areas of research encompass artificial intelligence (AI), supply chain risk management, and frameworks for using AI in the retail industry. Retailers aim to develop artificial intelligence (AI) and machine learning (ML) applications to address several objectives, such as tackling cyber security issues, enhancing the ease of ordering, and improving the online shopping experience.

Future research will encompass a vast range of possibilities as it focuses on the practical implementation of artificial intelligence, its impact on various operations, and the potential benefits it can provide to both customers and merchants. Merchants are currently exploring the application of AI in the field of online media management. The studies investigating the potential of AI to assist stores in managing their social media and online presence hold substantial scientific worth. Academics are likely to find research on AI's role in retail location analysis, store atmospherics, and format selections interesting.

IV. SUGGESTIONS & RECOMMENDATIONS

The future of the retail industry lies in artificial intelligence (AI). Artificial intelligence (AI) will have a gradual and increasing influence on various aspects of company operations, including research, pricing, inventory management, and customer shopping. Artificial intelligence is enhancing the quality of customer service in retail establishments. Stores are use cameras to monitor the duration of customers' presence and the time they spend looking at certain items, as well as to identify individuals involved in theft. Notably, corporations such as Amazon have already adopted a policy where customers do not need to go through a traditional checkout process. Unavoidably, not all events will consistently unfold according to expectations, as evidenced by Walmart's partnership with Bossa Nova.

Once artificial intelligence achieves dominance in the retail industry within a few years, it would be appropriate to conduct a more in-depth analysis of this subject. Examine the impact of AI on business transactions and customer loyalty over various time periods. This data can also be contrasted with the time before the advent of AI and subjected to a comprehensive investigation of the impact of AI on the retail industry.

The impact of AI on employment was another significant concern. If there is a decrease in strength or impairment in the ability to accomplish tasks, it is important to have a clear understanding of the studies in this field. This assessment failed to seize a valuable opportunity to comprehend the impact of AI in this particular subject.

Limitations and the Scope for Future Research

The current study examined artificial intelligence and its emerging applications in the retail industry. The study of Artificial Intelligence and its potential applications in many sectors and corporate processes is a nascent area. Consequently, there is a scarcity of comprehensive scientific studies about the intersection of AI and retailing. Extensive research and publications focus on the use of AI in a Western context. This narrows the scope of the investigation to a limited number of retailers in certain locations. The study's exclusive dependence on content analysis of published research limits the assessment of how AI has impacted the businesses of these merchants in the specific areas where it has been put into practice. Hence, to comprehend the impacts of using AI, a prospective study can adopt a case-centric methodology and meticulously examine a retailer that has adopted AI.

V. CONCLUSION

Artificial intelligence (AI) technologies are anticipated to have a significant influence on the retail industry. The content analysis indicates that organizations have incorporated artificial intelligence (AI) in various areas, including supply chain management, media optimization, customer service, retail operations, and risk management. Analysts predict that artificial intelligence will assume around one-third of work positions in the retail business by either 2030, 2035, or 2040 (Shankar, 2018). Artificial intelligence is predicted to completely transform and replace current retail processes and job positions. Retailers seek to employ artificial intelligence (AI) to support, rather than replace, human participation in retail operations. In order to improve the shopping experience, the businesses would prioritize the integration of the most effective combination of technology and interpersonal connection. Thus, it can be deduced that retailers are embracing artificial intelligence (AI) to improve consumer experiences and provide value for customers and other stakeholders. The key areas of concentration for AI research should include reasons, problems, impacts on AI adoption, and AI's ability to deliver value.

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