

REVIEW

Review of Artificial Intelligence with Retailing Sector

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ABSTRACT

This research service provides an original perspective on how artificial intelligence (AI) is making its way into the retail sector. Retail has entered a new era where ECommerce and technology bellwethers like Alibaba, Amazon, Apple, Baidu, Facebook, Google, Microsoft, and Tencent have raised consumers' expectations. AI is enabling automated decision-making with accuracy and speed, based on data analytics, coupled with self-learning abilities. The retail sector has witnessed the dramatic evolution with the rapid digitalization of communication (i.e. Internet) and; smart phones and devices. Customer is no longer the same as they became more empowered by smart devices which has entirely prevailed their expectation, habits, style of shopping and investigating the shops. This article outlines the Significant innovation done in retails which helped them to evolve such as Artificial Intelligence (AI), Big data and Internet of Things (IoT), Chatbots, Robots. This article further also discusses the ideology of various author on how AI become more profitable and a close asset to customers and retailers.

1. Introduction

In the fast-growing retail environment, retailer needs to re-examine what they are doing, how they are doing and how are they developing products. Shopping complex are embracing the technology so to become smarter to provide customer satisfaction, better service, better response to customer demands and supply to be in competition in the era of Artificial Intelligence and Big data^[2]. Online or offline, AI can accommodate vast descriptive data from enormous sources; images and videos and customer behavior and response. As a result of which a huge amount of data (i.e. Big data) which is released from different sources with distinctive patterns where we can record facial expressions of buyer and seller and draw a semantic process which can revolutionize a business^[3].

As an instance, a purchase from retailer includes various types of data in the form transactional data(i.e. cost price of product , quantity), customer data (i.e. age, gender, nationality etc.) and environmental data^[5].Where as to forecast a demand of product more actively and precisely ,a systematic identification response of consumer on sale behavior is needed. Subsequently, data management is one biggest issues and emerging field too in the retails industry, to resolve this issue companies are smearing “advanced and reliable data mining algorithms”^[5,15] to store and evaluate results to get better performance with data analysis.

2. Objective

(1) The main objective of the report is to define, describe, and forecast the global artificial intelligence in

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retail market on the basis of types (online and offline), technologies, solutions, services, deployment modes, applications, and regions.

(2) The report provides detailed information regarding the major factors influencing the growth of the AI in retail market (drivers, restraints, opportunities, and industry-specific challenges).

(3) The report aims to strategically analyse micro markets with respect to individual growth trends, future prospects, and contributions to the total market^[4].

3. Need For Change In Retail

Everyone admits the fact that Change is inevitable. Those days are gone when retailer can sell what they want to sell. Now, Retailers to have compete in every sector of excellence beyond price. Convenience and experience to consumer are becoming the two most crucial factor (Offline and online) of battleground for brands. As per a survey done the Store WPP in partnership with IBM on customers and retailers, its results that 48% should provide personalized promotion when they demand it online, also 45% of them wants similar online product availabilities as in-store. AI offers retailers the opportunity to both radically enhance and personalise the customer experience and to realise significant gains in productivity throughout the business - from the warehouse, to delivery, to head office and online and physical outlets. In a highly competitive market, retailers cannot afford to be left behind.

However, launching and progressing AI within a business does not come without its challenges: getting buy in from senior management (who often do not have a tech or data background), choosing the right partners and finding staff with the appropriate skill sets can all present significant hurdles. Another surprising fact came in front like retailers who are familiar with AI and wants to invest in it are 94% but ironically 91% of retailer also believes that it could be disruptive for their organization^[3]. On the other hand, customer want everything their own way: the way the shop, what they want to explore, customization and personalization, time they want to shop and they way want to get their products they want everything in their control. which leads to need for change in retailing and where Artificial Intelligence comes to fore^[4].

The best applications of AI work alongside other technologies and alongside people within retail businesses. That means seeing the deployment of AI not just as the development of isolated technology, but part of a wider process of change. That in turn implies that the UK needs to develop a talent pool for AI with a wide spectrum of skills. AI help the brands and retailer to understand the

consumer in different manner with the helps of smart devices which collects data, browsing cookies, facial expressions, euphemisms, preferences, living style etc. which can be synthesized to provide better recommendation to make fast and better decisions^[13].

4. Literature Review

To review topic of Artificial intelligence in retailing a set of articles were searched from Scopus. The search terms were "Retail" and "Artificial intelligence" with in topic search terms were "Big Data" and "IoT". "Computer science", "Business management and security" and "Engineering" were the subject area for Research. This resulted in 54 documents from which 20 were not cited. After re-searching of 34 documents 20 were not found in the Scopus database and rest 14 were chosen for comprehensive review.

Basically, the distinctive and numerous quantities of procedures are led to explore the proficient vitality. The board preparing for the impact of artificial intelligence in retailing which essentially lies in three explicit systems which are suggested as quantitative, qualitative and mixed method. Following that, these techniques have given a way to deal with experience a describe about few strategies that are utilized for proficiency, unwavering quality and operability of new techniques and gadgets in the era of retails. Subsequently, I have discovered a few relevant articles to comprehend the administration strength of artificial intelligence in retailing which have used techniques, for example, an interpretivist approach, case studies, mixed method approach and; Elastic net approach and sentiment analysis^[15].

4.1 Review On Sentiment Analysis

In this analysis done by Y. Li and H. Fleyeh^[17] information are gathered from Twitter, a small scale blogging stage, which has been generally utilized for investigation of notion ("positive", "negative" or "nonpartisan"). The slithered twitter information are those tweets incorporate "IKEA" in explored urban communities amid entry period of individual IKEA. Dialects explored in this work are English and Swedish. English-based tweets are best in class in Sentiment examination, while there is not very many investigations in the Swedish- based supposition examination. For further investigation author introduced elastic net approach method to investigate the public opinions. So as to explore general conclusions about recently opened IKEA store, neighbourhood inhabitancies' tweets containing "IKEA" are crawled (to be specific "IKEA dataset"). At that point the notion to discover vi-

sual tweets are figured for profound comprehension of their assessment. The system of Sentiment analysis to manage English and Swedish tweets is appeared in Figure 1. For English tweets, vocabulary-based methodologies is utilized thus in perspective on its capacity and validity in numerous present applications. But here author describe the limitation of sentiment analysis as the absence sentiment lexicon in Swedish dictionary which confine the research to some extent and its notion can be only anticipated by AI based strategies. The preparation information is assessment named Swedish tweets where each word in tweets are highlights encouraged into classifiers and related notion (“positive” and “negative”) are relied upon to be fitted precisely from elective AI classification strategies. The execution of these classifiers is assessed and the best one is summoned to foresee slant of Swedish IKEA tweets [17].

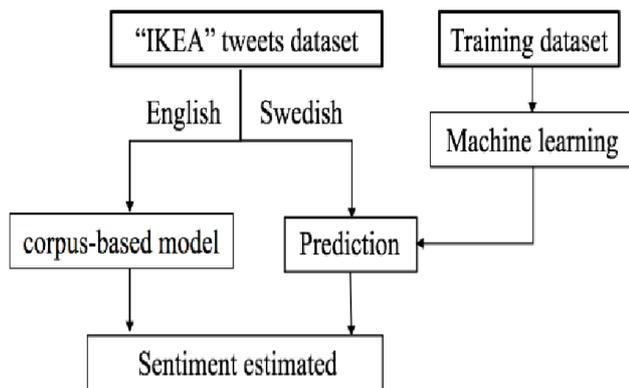


Figure 1. The proposed model to predict IKEA sentiment [17]

In addition to this author of “Shopping with a robotic companion”, F. Bertacchini, E. Bilotta and P. [2] They has used the sentiment analysis in purposing the robotic model NAO in the field of artificial intelligence in retails. The NAO robot can gather continuous discoursed and utilize the sentiment analysis for the advancement client’s disposition knowledge. This AI module studies the client feeling & mood and interconnects feelings inside the open settings, amid the shopping alliance with the mechanical right hand. Two procedures, the priori strategy and the developing have been followed. For the initial, a rundown of tags, action words, modifiers, verb modifiers and sentences for the six explicit feelings, physically portioned from tests of right-hand client’s collaboration in the real world has applied. Then on this specimen, the AI has been prepared. From there the emergent segment is carried on without the previous information, dealing with a similar example with just three fundamental class, for example, positive, nonpartisan and negative. With this AI module, we have had the capacity to relate personal conduct standards and feelings with discourse. [2]

4.2 Review On Quantitative Research

Author, R. Seranmadevi and A. Senthil Kumar [13] in the article “Experiencing the AI emergence in Indian retail – Early adopters’ approach” has adopted quantitative approach in favor getting result of Artificial software in retail sector. A disproportionate multistage judgement testing system has been utilized to gather the information from 610 customers situated at four capital areas of India, for example, Tamilnadu, Kerala, Karnataka and Telangana individually. Information was gathered amid first quarter time of the year 2018. The essential information were gathered from the customers of the over four urban communities through organized poll prepared in online mode. Since the examination depends on early adopters’ approach however the creation of AI advances is to a great extent accessible just at the capital district of these states instead of the entered area. Expressive research configuration is utilized to portray the goal of customers’ domain towards the rise of AI in the Indian retail segment.

The examination is constrained to southern piece of India and it secured capital city of four states alone. The example is constrained to 610 respondents. The fitting factual strategies and apparatuses had been utilized in the investigation to touch base at the discoveries. The utilizations of AI advances in on the web and disconnected retail are assembled independently and its impact on structure the quality, CRM and huge information was developed. Further, its effect on the retailers aim and clients amuse are contemplated through Structural Equation Modelling utilizing AMOS programming V.20 and it was tried with the suitable speculation.

4.3 Review On Interpretivist Approach

In the review paper by G. Santoro et al. on the subject of “Big data for business management in the retail industry”, author has used interpretivist approach. Author justifies this approach by describing that “This is regarded a fitting strategy for this sort of point since it covers another space and in light of the fact that there is restricted information available about how firms use and manage Big data in retails. In this regard, the case study is a suitable technique when researchers need to address inquiries concerning the “how” and “why” of a specific point. [18]

The various case study methods are especially pertinent for interpretivist approach. In detail, to accomplish the objectives of this paper, a subjective methodology was embraced through a numerous case study approach including firms working in the retail business. Author has taken five associations working in the retail business. To maintain a strategic distance from predisposition, the accompanying

advances and techniques were utilized. Initial, a comfort choice was made among the best performing associations in this area, so as to give bits of knowledge getting from high-performing standards. They were then reached to ask about their accessibility for contribution in meetings and their methodology toward Big data arrangement. Five were accessible for meetings and were the keenest on this exploration and point. Additionally, these were firms really conveying Big data in procedures and exercises. The accompanying case determination criteria were picked: the case is spoken to by a high performing retail firm, and the case presents genuine usage of huge information stages or activities, somewhat. Subsequent to applying these criteria, one firm was barred as it had not conveyed enormous information like different ones. The four chose firms had sent big data in their exercises something like one year before the meetings. Data Analysis started with thinking about the mission, vision, qualities and techniques of the firm, alongside the general history. This information was triangulated with information got from the meetings and the outcomes were broke down. To fill in missing delicacies, when vital, line up correspondence was directed with the firm by means of email or potentially phone. In understanding with the organizations, it was chosen to give the examination as unknown contextual investigations to avoid any conceivable misinterpretations because of the open idea of its substance. Firms wanted to stay unknown to abstain from uncovering key choices and viewpoints, particularly in light of the high centralization of this industry and the predetermined number of well-performing players in it. At long last, unknown cases may consider extrapolating all the more genuine data from respondents. Author observed that, it is intriguing to feature that all the four retail firms profoundly and consistently utilize huge information investigation to improve forms. Every one of the interviewees expressed that huge information in the retail business assume a key job, particularly in the advertising and coordination capacities and that this significance will just increment.

5. Artificial Intelligence With Retailing

“Retailing as a function is central to all economies and a part of retailing value chain”^[12]. Thus, AI will have greater impact on retailing among the other digital technologies^[3]. AI is transforming the way of retailer interaction with the consumer and consumer protocol to choose a product. Ranging from Siri on Apple iPhone, Watson of IBM, Cortana of Microsoft, Alexa of google to Deep Mind of Alphabet varies in context and are mostly adopted by retailers and consumers^[3,6]. AI possess marvelous response of customer as they shop online or in-store. As they can

make choices among different products which suits them the best, get to know the physical location of products in-stores and compare different brands.

These responses will further be tailored into systematic dataset based on visual, textual and facial expressions to perform predictive analysis to forecast the demand and behavior of consumer. As described by^[4], to trace in-store behavior of customer by Beacon, Closed-circuit television (CCTV), Radio Frequency Identification (RFID), and Near Field Communication (NFC) are used in similar fashion clickstream behavior is used in online tracing. From these RFID is widely used in retails and logistic and is the base technology for IoT^[10].

IoT is expected to be the trendsetter upcoming technology in almost every era of industry^[16]. However, the alleged acceptance and deployment of IoT is in initial stage which indicates the lack of adaptive strategies in industries^[9].

Also, Seranmadevi and Kumar^[13] supports the fact that AI works at backdrop to accumulate the data, store and process the data into information about customer which helps to build big data structure and strengthen Big data analytics which success based on right people training and analytical training. Big data is essential in paradigm shift to industry 4.0 revolution for online company’s decision support. It can inculcate the data to information and use it more effectively to offer personalized customer services both online and in-store^[8].

6. Application Of Artificial Intelligence With Retail

Retailer, especially offline, are facing continuous change in the customer behavior. Thus, they need to keep them updated by providing low-cost alternates to e-commerce to customer at low management cost^[2]. Therefore, researchers are designing Robots which can fulfill the desired function of maintaining shops at low cost, performing both back-end and front-end operations, real time updating of shelves etc.^[2,5].

As reported by International federation of robotics^[7], it is seemed that growth of robotics in the market of social, professional and domestic use is drastically increased. Meanwhile, Artificial Intelligence and augmented reality kind of fiction is becoming reality^[3]. It is widely accepted that Artificial Intelligence is a process of understating human behavior and embedding the neurology into machines so that they act smarter and help the human by their own understanding^[2,3,6]. Machine learning and Reductionism is transforming the way of interaction of machine to machines and machine to humans^[2].

As described in Smart Shopping by IBM and Molnar G, Bots are software appearance of robots which carries certain

programmed task is categorized into two types chatbots and conversational bots [2,11]. Where Chat bots are most commonly in use by websites where they assist you commonly asked questions which saves your time enhances user experience and collects data; and Apple’s Siri, , Google’s Alexa, Microsoft’s Cortana, IBM’s Watson and Amazon echo comes under conversational bots which are smart enough to understand the intent of questions and learn your nature of question [1,5]. IoT is one of the significant technologies in the field of AI which is transforming the retail entirely. IoT, which is based on network of electronics, sensors and software to collect data is responsible to converse machine to machine with cognition and reasoning or in can defined as when Internet combine with devices, IoT Emerges [8].

IoT provide retailer a set of distinct data from which they can optimize their process to achieve more customer satisfaction. “Bosch Home Connect ovens, Samsung smart washers and dryers, Nest thermostats, Ring video doorbells, security of SimpliSafe, GPS and accelerator sensors on smartphones, and RFID products” are example IoT smart devices [6]. Moreover, many companies are trusting AI technology and turning the science fiction into reality such as Augmented reality and virtual reality which bring real time experience to users virtually (i.e. Simulator, VR training sessions, flight simulators) and making driverless car using AI, using of drones to supply goods [6,14].

For instance ,Amazon has showed interest in making drones delivery ,Tesco, Walmart, Target etc. has started exploring deep learning of data which can create lucrative offers by evaluating real time customer behavior [15], McDonald’s has installed automated kiosks to remove the need of cashier and customer representative.

S.NO	Company Name	About the company	Technologies
1.	AMAZON	The online retail giant offers both consumer and business-oriented AI products and services and many of its professional AI services are built on consumer products. Amazon Echo brings artificial intelligence into the home through the intelligent voice server, Alexa	BigData, IOT,AI,Machine Learning, AWS,Cloud
2.	IBM	The multinational technology company IBM has been active in AI since the 1950s. The company was involved in the birth of artificial intelligence and is still firmly committed today. With Watson, IBM has created a machine learning platform that can integrate AI into business processes, such as building a chatbot for customer support. Customers include Big Four Auditor, KPMG and Bradesco, one of Brazil’s largest banks.	cloud, big data and analytics, blockchain, IoT, machine learning, Linux and AI

3.	FREE-NOME	<u>Freenome</u> uses artificial intelligence to conduct innovative cancer screenings and diagnostic tests. Using non-invasive blood tests, the company’s AI technology recognizes disease-associated patterns, providing earlier cancer detection and better treatment options.	Google Analytics , G Suite (formerly Google Apps for Work) , AI and nginx
4.	AEYE	<u>AEye</u> builds the vision algorithms, software and hardware that ultimately become the eyes of autonomous vehicles. Its LiDAR technology focuses on the most important information in a vehicle’s sightline such as people, other cars and animals, while putting less emphasis on things like the sky, buildings and surrounding vegetation.	Robotics, AI, Machine Learning
5	Lobster	Lobster is an AI-powered platform that helps brands, advertisers and media outlets find and license user-generated social media content by scanning major social networks and several cloud storage providers for images and video, using AI-tagging and machine learning algorithms to identify the most relevant content. It then provides those images to clients for a fee.	Google Analytics , Vimeo, and Google Tag Manager, Artificial Intelligence and algorithmic engineering.
6	SIE-MENS	Siemens focuses on areas like energy, electrification, digitization, and automation, as well as resource-saving and energy efficient technologies and a leading provider of devices and systems for medical diagnosis, power generation, and transmission.	Robotics, AI
7	AIBrain	AIBrain is an artificial intelligence company that builds AI solutions for smartphones and robotics applications. It has three products: AICoRE, the AI agent; iRSP, an intelligent robot software platform; and Futurable, a future simulation AI game where every character is a fully autonomous AI. The focus of their work is to develop artificial intelligence infused with the human skill set of problem solving, learning and memory.	Robotics,AI, Machine Learning

8	Case-Text	Casetext is an AI-powered legal search engine specializing in legal documents, with a database of more than 10 million statutes, cases, and regulations. A recent study comparing legal research platforms found that attorneys using Casetext's CARA A.I. finished their research 24.5% faster, required 4.4 times fewer searches to accomplish the same research task, and rated the cases they found to be 20.8% more relevant than those found on a legacy research tool.	Natural Language processing, AI, Machine Learning
9	Qualcomm	Like HiSilicon with its Kirin 980, Qualcomm is another chip manufacturer that is committed to artificial intelligence. AI plays a crucial role in the Snapdragon 855 mobile platform. The chip uses a signal processor for AI speech, audio and image functions. Qualcomm Snapdragons power some of the most popular smartphones on the market. If you're interested in AI in the smartphone, you should keep an eye on Qualcomm.	Artificial Intelligence
10	NVIDIA CORPORATION	Nvidia Corporation builds graphics processing units and hardware to power various types of AI-enabled devices. The company's technology is used for everything from robots and self-driving vehicles to intelligent video analytics and smart factories.	Personal Computer graphics, graphics processing unit (GPU) and also on artificial intelligence (AI).

7. Conclusion

This research paper concluded the facts that the world of online and offline are congregating which is due to the change in shopping, thinking, demanding and receiving behavior of consumer. Willingly or unwillingly retailers have to opt to new standards of innovative technology to meet the consumer demands or they have to face decline in sales and revenues. Companies have started embracing the Artificial intelligence into their business process which are not only boosting up their businesses but also giving them better suggestion based on the distinctive data captured through new smart device, RFID, Robots, Chat Bots, Conversational bots, Big data, Facial expressions of consumers, their choices, IoT and many else smart and innovative technologies which supports machine learning, deep learning, Artificial augmentation and Intelligence, Virtual reality. Yet, this phase of AI is in preliminary stage which make the gap of experience strategy to hold the direction in which AI should be implemented as per business needs.

The failure to initiate direct, personal customer relationships is not an option in this new landscape. Overall, the biggest advantage retailers can gain from AI is accurate, efficient analysis and proper utilization of all of the customer data at their disposal.

AI has – and will – continue to alter the retail industry. The next few years will see continued enhancements to both customer experience and operations. However, retailers aiming to fully take advantage of these technologies in order to keep pace with giants like Amazon and Walmart still have their work cut out for them.

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