

ARTIFICIAL INTELLIGENCE IN RETAIL INDUSTRY

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ABSTRACT

Artificial Intelligence (AI) brings a lot of changes in the way how things work, and how much we work. The power of AI is seen in changes in several areas like healthcare, transportation, education and even marketing and retail industry. All these industries are going to see drastic changes and innovation in the forthcoming years.

There was a thought that online stores will totally take over the market and wipe out existence of physical stores but according to the studies by Euromonitor International, 83% of goods purchased globally in 2022 will be still bought in store.

The trend of brick-and-mortar stores gaining popularity with the millennials that makes the stores to go for a store make over. Store make over requires the use of in-store technology which would give the consumers a real-world experience. Man-machine interaction is essential to derive better and efficient business outcomes. Retailers are now constantly working on providing personalised services to their customers and in future customers will be asking for hyper-personalised experience.

Many brick and mortar stores are getting closed. Coresight research predicts that about 12,000 stores were closed in US by the end of 2019. Growth of Internet technologies and automation is responsible for this but the same technology can be used to gain a visibility of the store and a competitive edge. AI is going to disrupt some existing business models and in the next five years the world is going to be functioned in a different manner. We need to be prepared for this change by adopting new skills. AI technologies like machine learning, computer vision, augmented reality, virtual reality are applied in new retail applications.

The paper aims to study the transformations in which AI will bring in the retail sector.

KEYWORDS: Artificial Intelligence, Disruption, Intelligence, Retail Industry & Machine learning

1. INTRODUCTION

Artificial Intelligence (AI) is the science and engineering of making intelligent machines, especially intelligent computer programs (John McCarty). It is a branch of computer science which deals with the building of smart machines which are capable of performing tasks that need human intelligence. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable.

Artificial Intelligence is going to be a boon for retail industry. Studies suggest that AI could save retailers as much as \$340 billion annually by 2022. Capgemini estimates that 80% of the savings would come from AI enabling more efficient processes for supply chains and returns.

While purchasing a new dress, customer used to waste a lot of time by trying each dress in the trial room and he would get irritated if he doesn't get what he was thinking to buy. Digital mirrors in virtual trial rooms will resolve this problem. Customers can try dresses again and again without going to the physical trial room and avoid changing the dresses numerous times. Customer data is captured and AI can help to gain insights with this data repository. AI can be used to run a touchscreen smart mirror. Customers can browse and select what he wants using the smart mirror. Retail store can become a store house of innovative designs and draping ideas. Personalized shopping experience can be created by using online chatbots, intelligent in-store bots and other web shops. Based on their preferences and style, customers can see how they look in different dresses using the touch free screens and choose what they want in lesser time and enjoy a great shopping experience. Chatbots help the retailers and customers. They give notifications about new collections, help the customers to find the garments they are looking for in the site, help them to pick the apparels similar to their previous purchases. Many global brands like Burberry are using chatbots and some are planning for its usage. Burberry has launched on Facebook messenger AI driven chatbots, this helps to answer customer queries.

AI has created checkout-free stores. It will record products taken on the customer's virtual card. There will be sensors and cameras all around the stores to track what the customers have purchased. Sensors are the tools for information gathering and event detection. Customer leaves once he has done with his shopping. He will receive the receipt of his purchases later which is deducted from his account. Once the customer is done shopping, they can just leave. Later, they'll receive a receipt. This will avoid huge queues at the billing and checkout counters.

AI powered kiosks can display products and sense customers reaction to various colours and styles using neurotransmitters and the kiosk will suggest products based on customers reactions.

AI systems not only give benefits to customers but also they give advantages to the retail stores by supplying chain optimization, store optimization, hiring employees. There are studies that indicate millennials preferred retailers who are using AI technology to showcase more products.

2. BRIEF HISTORY OF AI

Scientists have been working on artificial intelligence with an objective of developing machines that will think and learn like humans.

Karel Capek (1920) published a science fiction play which was popularly known as R.U.R (Rossum's Universal Robots). The play was about a factory that created artificial people. These artificial people were somewhat similar to clones and he called it as Robot. So, the term Robot and idea of creation of robots may have emerged from this play.

Alan Turing (1936) developed a computing machine called 'Turing machine' in which he applied various theories to prove that a computing machine is capable of executing cognitive processes. This was the foundation for what we call artificial intelligence today. The Nazi Germany used the code of Enigma which was encrypted by Alan Turing. His studies lead to the theory of computation. Around the same time there were discoveries in cybernetics, information theory and neurology and Turing came up with the idea of creating an electronic brain.

Arthur Samuel (1952), a computer scientist, developed a checkers-playing computer program – the first to independently learn how to play a game. Allen Newell (researcher), Herbert Simon (economist), and Cliff Shaw (programmer) in 1955 co-authored Logic Theorist, the first artificial intelligence computer program. John McCarthy

coined the term "artificial intelligence"(1956) at Dartmouth conference. He and his team believed that the aspects of learning as well as other characteristics of human intelligence can be simulated by machines. He invented Lisp language. Samuel (1959) coined the term "machine learning", computer became the first to work on to play a game of chess better than the human.

An industrial robot, Unimate invented by George Devol was used by General Motors assembly line in New Jersey. It helped in transporting die castings from the assembly line and welding the parts on to cars. This avoided the risks posed if done by humans. Daniel Bobrow (1964) created an AI program called STUDENT, written in Lisp that solved algebra word problems. Joseph Weizenbaum (1965) develops ELIZA, an interactive program that carries dialogue in English language on any topic. Charles Rosen (1966) developed the first general-purpose mobile robot, Shakey with the help of 11 others. It was also known as the "first electronic person".

In 1970s, AI field faced a lot of challenges as the Government of developed countries reduced its support in AI research. The first anthropomorphic robot, WABOT-1 was built in Japan. Its features include moveable limbs, ability to see, and ability to converse. AI paved its way in medical field. MYCIN, an Expert system developed by Ted Shortliffe (1972) is used for the treatment of illnesses. The movie STAR WARS was released in 1977. In this movie a humanoid robot, C-3PO, featured and is shown as being "fluent in more than seven million forms of communication". There was a slowdown in the AI research for some time and it was called as AI winter (around 1974).

AI came back in the form of expert systems (ES) after AI winter. In 1980, a robot WABOT-2 was built which allowed the humanoid to communicate with people as well as read musical scores and play music on an electronic organ. In 1981, Japanese Ministry of International Trade and Industry allocated \$850 million to the Fifth Generation Computer project. The project's objective was to develop the computers that could converse, translate languages, interpret pictures, and express human like reasoning. In the same year, SID (synthesis of integral design), which was an expert system was developed using VAX CPU logic gates. In 1986, computers used voice technology. NETtalk is one of the early artificial neural network (ANN). It consists of program that is able to read datasets which are in words and pronounce them correctly. In late 80s and early 90s there was a second AI winter.

Richard Wallace (1995) was inspired by ELIZA and developed the chatbot A.L.I.C.E (Artificial Linguistic Internet Computer Entity). AI chess computer 'Deep Blue (1997)' from IBM defeated the world chess champion Garry Kasparov in a tournament. Deep Blue would calculate upto 20 moves using a tree search algorithm.

Microsoft (2000) launched the first gaming device Kinect for Xbox 360 that tracked human body movement using a 3D camera and infrared detection. The computer program 'Watson' (2011) competes in a U.S. television quiz show and wins against the human players. DeepMind (2013) could play Atari games like top human players. An agent (2015) was introduced who could play 49 Atari games by himself. DeepMind is developing even complex games like Starcraft2, AlphaGo. In 2018, Google demonstrated at a conference on how the AI program 'Duplex' calls up a hairdresser and makes an appointment.

3. HISTORY OF RETAIL AUTOMATION

People used to buy goods from neighbourhood stores. Innovation came in the form of shopping malls. People found it convenient with many shops coming under one roof. Air conditioned shops, elevators and other facilities helped customers to move around in the shopping malls in a comfortable ambience.

In 1994, Amazon came up with delivery service of small catalog of products. By 2000 they had a wide range of products. Online shopping and online payments are the biggest retail automation innovation.

4. LITERATURE REVIEW

By 2020, 85 percent of customer interactions in retail will be managed by artificial intelligence (Gartner).

“87% retailers are deploying some forms of AI in decision making”

“Today, most post-sales interactions are handled manually, but in 2019, AI-powered bots will help customers self-serve and resolve their problems faster” (Abinash Tripathy, Founder, Chief Strategy Officer, Helpshift).

“AI is revolutionizing the retail industry by making it cost-effective to deliver a completely personalized, immersive and optimized experience for every individual consumer at massive scale” (Daniel Druker, CMO, Instart).

“AI has, and will, continue to change retail. There are four main areas where AI is currently changing retail and where AI will change retail in the future: assortment planning, personalization, voice ordering and customer support” (Matt Sargent, Senior Vice President of Retail, Magid).

“All retailers are under disruption right now. If you don’t develop a direct relationship with your consumers, you will not survive. This disintermediation is critical to get data about your customers. With this data, AI can be used to create customized recommendations and products, which is all expected from consumers today” (Matt Glickman, Vice President of Customer and Product Strategy, Snowflake).

“Every customer who walks into a store will be able to interact with a chatbot knowing all of their shopping history, preferences and other relevant information to make recommendations, offer special discounts and handle customer-service issues,” Rob Garg, vice president

“AI’s biggest benefit to the retailers will be the analysis of all the wealth of data they have and creating actionable items that can be executed against them. Had machine learning not been there, they wouldn’t have the opportunity to actually act on it” (Chris Miglino, Co-Founder, CEO, Srax).

“ML (machine learning) is a crucial step towards development of smart softwares where it can learn through its own experiences and trials, finding optimal solutions” (Business of AI, Andrew McCafee, Erik Brynjolfsson).

“Retailers are reaping advantages using AI, robotics, drones” (Van Droon et al.).

“Every retailer will compete so store location evaluation for competition is essential” (Redin Baugh).

5. ADVANTAGES OF AI IN RETAIL

- **Automation** of manual tasks including order placement, query response, order management, order tracking, inventory management and other administrative tasks.
- **Planning** which includes supply chain optimization, route optimization, demand and capacity management.
- **Supply chain optimisation:** At every step of supply chain, internal, external costs and expenses can be estimated. There is freight costs reduction for third-party logistics businesses and their clients. The risk is managed and minimized for suppliers by understanding environmental factors and other variables. Better upstream and

downstream planning for raw material producers, manufacturers, logistics companies and other supply chain stakeholders.

- **Route optimization:** GPS tracking can be linked to understand progress through the supply chain and optimize routing for maximum speed and efficiency. Allow for more effective, self-guided, robotic operations by automation of cars, trucks, ships, delivery robots.
- Using **predictive and prescriptive analytics** can forecast and model for trends across multiple retail products and locations.
- To meet the demand, we can optimize the throughput of orders, suppliers and manufacturing.
- AI can help you optimize speed and accuracy throughout the supply chain when the customers demand for faster delivery and high-quality products. AI can help you streamline your logistics and fulfilment options, giving a competitive edge.
- **Time Saving.** Retail stores can use virtual racks and trial rooms and have a gesture and touch-based interface. Using this touch free monitors customers can get the right look and style. They can view how they will look in different attires. Accessories for these attires can be suggested. Based on their past purchase and preferences recommendations are given. Customers can see these recommendations without browsing through plies of clothes and trying each of them. Not only retailers selling clothes even stores with beauty products or cosmetics are benefitted, customers can see how they look after applying these products without having to actually apply on their body.
- **Cost Reduction.** The chatbots answer multiple customer queries simultaneously with less in-house staff.
- **Better customer satisfaction.** Chatbots help retailers to provide quick and personalised connect with the customers. They are connected with the brand when they get personalized messages, Robots and touch panels can be placed in the stores to help customers locate a product in the store.
- **Reduce thefts.** Stores can use AI and the footages from surveillance can be monitored real time this will help to store owners to take quick action.

6. HOW DOES AI WORK FOR RETAIL SECTOR?

AI technology gathers data from number of sources and builds a large data-set. The datasets are run through algorithms and based on these algorithms it designs a model which answers like real human. The answers are obtained based on the data gathered. In the retail industry, data set comprises of sales data linked with customer data. The information which is collected in the form of data sets is run through algorithms. The algorithms generate an AI model which predicts trends about customer purchases, product sales or inventory. Most of these algorithms follow a cycle which is as follows: gathering training data, training the model, continuously work to improve performance using a feedback loop. Systems generate patterns from the data set gathered and cleansed. Retailers can learn to assess and predict outcomes from the data sets. This information can be used beneficially in retail business. Like the customer, data set will help to understand a customer better by learning about their preferences and behaviour pattern

The AI algorithms help to understand what a customer wants and when he wants even before he actually does the purchase. The retail store since it knows beforehand the customers behaviour it can make the customers to buy more by

offering some coupons or additional benefits. The coupons offered may make the customer to buy some additional products for which he had not initially planned for. The algorithms will help to understand what exactly the customer is looking for, so, the retail store provides him with an experience what he is looking forward. The algorithms can help to understand how the products can be placed in the store. The algorithm studies customer buying patterns and learns what are the things they buy together. The retail store can use this and place the items next to each other and the customer while picking one item ends up picking the other item too. This makes when one product is sold, the sales of other product too happens and the retail store get benefitted.

AI can be used to track inventory and alert the store to restock the goods or if fresh stocks are not sold it needs to be replaced. It helps to check if retailers are pricing the products correctly. Artificial intelligence can help to find out if the stores are selling the right products as per customer demands and expectations, are they placing the products in the right place in the store.

Social media data set build from data gathered based on customers likes, comments can help retailers to find customers interests, their sentiments and latest trends. Based on this the retailer can give offers for specific customers. Main objective of all these algorithms is not to just predict the likelihood of customer purchase but also what can be the strategy applied to increase the likelihood of customer making a purchase.

7. FUTURE OF AI IN RETAIL

Retailers and customers will be benefitted. Studies indicate that deploying AI could save more than \$340 billion by 2022. Customers are looking for personalization that AI will provide. Research shows (Epsilon) 90 percent of the customers found personalisation a lot more appealing. AI and machine learning play an important role in retailer decision making. Retail theft is still a problem. Shop lifters, inspite of having cameras, door alarms in retail stores they continue with their activities. AI can give strategies to prevent those thefts. AI bots will help in doing repetitive purchases of daily transactions such as bread, butter, milk, etc and save time. It is believed that AI will be bringing transformations in various areas in retail like manufacturing, logistics and delivery, customer recommendations, sales and payment services. There is a trend of rise in adoption of omni channel or multi-channel retailing and the retail industry is anticipated to witness the highest growth in the trend of Omni channel retailing.

At present artificial intelligence is being used only by large retail chains which can afford technology infrastructure budgets. Artificial intelligence will be playing an important role in bridging the gap between online and offline retailing in coming years and it will come out with the solutions specifically designed for even small retailers. Automation can lead to loss of few jobs but it will eliminate the inefficiencies caused by humans. Repetitive tasks can be automated resulting in efficient utilisation of resources and improvement in performance.

Emergence of new business models like C2M (consumer to manufacturer). This model will use the power of AI and big data and the manufacturers can design products as per consumer needs using e-commerce infrastructure.

Retail analytics is getting popular and is used to find the ways to enhance business performance. Retail industry is looking at adding AI in its platform for improving performance in pricing, promotions, target marketing, inventory management and other areas.

Data driven retail with unmanned systems is the future of retail industry.

8. CONCLUSIONS

AI is bringing a lot of disruption in various sectors. The future jobs need high skills and more interaction with automation. But for this automation human talent is also needed to create, manage control everything in new avenues for an automated future. AI will give a lot of benefits in terms of cost reduction and efficient utilisation of resources but human touch still will stay.

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