A STUDY ON ARTIFICIAL INTELLIGENCE IN E-COMMERCE

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Abstract:
Artificial intelligence has the powerful ability to acquire and analyze large volumes of data and provide decisions for action. E-commerce is now adopting this technology to identify patterns based on browsing, purchase history, credit checks, account information etc. This data collected then form the basis of creating customized recommendations for each customer. Google and Microsoft are already investing into new AI initiatives. Many e-commerce businesses have started implementing different forms of AI to better understand their customers, and provide an enhanced customer experience. This paper highlights the role of artificial intelligence in e-commerce and its application in different areas of e-commerce.

Keywords-*Artificial Intelligence, E-Commerce, Machine Learning*

I. INTRODUCTION

Artificial intelligence is the engineering and science of making intelligent machines and intelligent computer programs. Artificial intelligence is different from psychology because it emphasis on computation and is different from computer science because of its emphasis on perception, reasoning and action. Artificial Intelligence is to develop intelligence in the machines or software and provide them the ability to think as humans. John McCarthy is known as the father of Artificial Intelligence. Artificial intelligence is based on various disciplines of a science and technology such as Biology Computer Science, Psychology, Linguistics,

Mathematics, and Engineering. Companies can utilize the AI machines algorithms to identify patterns and insights in the huge amount of data.AI can help them take decision faster and improve their position in the competitive business world. Gartner stated that more than 85% of customer interactions will be managed without a human by 2020 [10]

Artificial intelligence has 2 types:
1. Weak AI.
2. Strong AI.

1. Weak Artificial intelligence

In weak artificial intelligence, machines behave like an intelligent human. Machines with weak artificial intelligence have all abilities like thinking, moving, talking but are programmed to do so. In the chess game, the machine has the ability to play but it does not possess any thinking ability like humans. The machine is programmed to play chess and make smart moves to compete with other players.

2. Strong Artificial intelligence

In strong AI, machines actual ability is like humans. It is based on the concept that machines can be programmed like the human mind. They can think, make decisions, and have perceptions and beliefs. E.g. the artificial intellectual supercomputer "WATSON" invented by IBM. Strong AI does not currently exist. It is estimated by some experts that it may be developed by 2030 or 2045.

II. LITERATURE REVIEW

In paper [2] artificial neural network based software cost estimation technique has been proposed. It uses ANFIS to improve the precision of software cost estimation. The data used is the DESHARNAIS data set from PROMISE Software Engineering Repository. The proposed model performance has been analyzed in terms of MAE, Correlation Coefficient, and RMSE.ANFIS model has outperformed than regression model with the RMSE value of 780.97 against 3007.05 of the regression model.

In paper [3], new plagiarism technique has been proposed based on K-NN method. This method clusters the string and matches words with neighbors. A counter is used to the count number of the string matched in compared files. Firstly, the file is compared with the existing set of files. The set of words which are matched are selected as copied words and showed as output. This technique finds the frequency of every matched copied word in the file. It also calculates the percentage of matched copied words.

In paper [4] artificial intelligence based cheque signature verification system has been proposed. The first step in proposed system is to acquire the signature image. In proposed work, Actual and forged signature images of 10 persons have been used to train the neural network. Features are selected from the image like stroke, color dominant, histogram, moment invariants, GLCM. The extracted features from the image are then used to train the artificial neural network and for testing. The proposed system uses less time as compared to existing verification method.

In paper [7], the concept of natural language processing has been studied. Natural language processing is one of application of artificial intelligence. Natural language processing is done to analyze, understand the human language by computers. The steps involved in NLP are morphological analysis, syntactic analysis, semantic analysis, discourse integration and pragmatics analysis.

III. APPLICATIONS OF ARTIFICIAL INTELLIGENCE (AI)

AI adoption has been observed at many areas. Some examples are following:

1) Gaming: Machines can now compete with humans in games with artificial intelligence.AI implementation can be seen in many strategic games such as poker, chess, tic-tac-toe, etc. Machines are empowered with ability to think of many positions based on heuristic knowledge. Deep Blue was the first a chess-playing computer developed by IBM. Other example is of Google's AlphaGo.AI Go player has defeated Ke Jie, Go world champion

2) Banking: AI application also lies in Anti-money laundering (AML). Money launderers hide their actions to increase their illegal money. This illegal is documented so well so as to give the illusion of legally earned money. Banking Industry across the world is shifting from traditional detection of AML to artificial intelligence based systems .AML AI detection system can recognize patterns to detect defaulters.

 3) Expert Systems − the expert systems are the developed to solve complex problems in a particular domain, with the artificial intelligence. The purpose of expert systems is to advise, predict results, suggest alternative solution and assist human in decision making. The components of ES are

- Knowledge Base
- Inference Engine
- User Interface

Examples of expert system are MYCIN, AGREX, CALEX, LEY and GERMWATCHER etc

4) Healthcare: AI application in healthcare lies in Diabetic Retinopathy Treatment, Medical Diagnosis, Risk Prediction and Automating Drug Discovery. For example, In Skin Cancer Treatment Sebastian Thrun's lab at Stanford released an AI algorithm which detects Skin Cancer with very high accuracy.

5) Vision Systems: Vision systems can understand, interpret, and comprehend visual input on the computer. For example-Medical experts use such system to

diagnose diseases. Investigation experts also use the vision system to recognize the face of criminal with stored photograph given by the forensic artist.

*6) Music and Movie Recommendation Services***:** AI based apps like Spotify, Pandora, and Netflix recommend music and movies based on the interests of users and their past choices. This data collected is then fed into AI learning algorithm to suggest recommendations.

7) *Handwriting   Recognition*:   The   handwriting recognition software acquires the data through the text written on paper or on screen. This software then recognizes the pattern in handwriting like shapes of letters and the text is then converted to editable text.

8) *Intelligent Robots* -Robots embedded with sensors such as sound, bump, pressure, heat, light and temperature can detect the physical data and perform the instructions by a human. They have efficient processors and huge memory to make smart decisions and exhibit intelligence. Intelligent Robots are also capable to learn from mistakes.

IV. ARTIFICIAL INTELLIGENCE THREATS

A) Threat to Privacy

Natural language processing is the ability to understand human language by machines.AI program with the ability to recognize speech and understands natural language is also capable to understand each user conversation on emails and telephones. This may comprise privacy of users.

B) Threat to job

Citigroup has forecast that nearly a third of the jobs in the banking industry could be lost in the decade between 2015 and 2025. The computer can also perform some tasks of a doctor's job. IBM's Watson can detect lung cancer by analyzing MRI scans much more reliable than real people. Some accountant's task can also be done by algorithms. Algorithms can now analyze financial data and prepare accounts. Insurance brokers and insurance can also be performed by computers using machine learning and big data.

Other threats are the threat to human safety and human dignity.

VI. E-COMMERCE

Electronic commerce, or e-commerce, can be described as the buying and selling of goods and services on the Internet. E-Business is another term sometimes used in place of e-commerce. Examples of e-commerce sites are flip kart, eBay, infibeam.com etc. E-Commerce provides unique features of non-cash payment, 24x7 Service availability and improved sales. According to the Silicon Valley venture capital firm Kleiner Perkins Caufield Byers report, Amazon India is most likely to dominate the country's online retail market in the long run. Following are some e-commerce models:

1. Business-to- Business (B2B)

2. Business-to- Consumer (B2C)

3. Consumer-to- Business (C2B)

4. Consumer-to-Consumer (C2C)

5. Government-to- Business (G2B)

6. Government-to- Citizen (G2C)

V.ARTIFICIAL INTELLIGENCE IN BUSINESS

According to a study by Avanade, a survey of 500 business and IT leaders from around the world revealed that they expect to see 33% increases in revenue as a result of smart technologies. Avanade [8] is a joint venture between Microsoft and Accenture that leverages the Cortana Intelligence Suite and other solutions for predictive analytics and data-based insights. Other example is The Apptus eSales solution is designed to automate a predictive understanding of consumers. This software combines the big data and machine learning to determine which products might appeal to a potential customer as they search online or get recommendations. The machine learning can predict and automatically display products related to search phrases when customer visit Apptus eSales enabled online store. Google Company has showed its interest in AI with purchase of DeepMind, AI Company. Three

important aspects of AI that e-commerce businesses can use are:

A) Data Mining

B) Natural Language Processing (NLP)

C) Machine Learning

Types of machine learning:
1. Supervised learning
2. Unsupervised/predictive learning
3. Reinforcement learning

Artificial intelligence tools for business are:

TABLE I
AI TOOLS FOR BUSINESS

Business Area	AI Tool
Customer Relationship-	DataFox, DynamicYield, jetlore, Takt, Kasisto
Customer Support	Aaron, DigitalGenuis, ClaraBridge, ActionIQ, Brain,
Market Research	Bottlenose, Enigma, Quid, Mattermark, Tracxn
Marketing	AirPR, Crystal, Datorama, Albert
Sales	6sense, Aviso, Enquire, Clari, Spin, Tethr
Business Intelligence & Analytics	Arimo, Ayasdi, DataRobot, Einstein, Sundown

VII. AI IN E-COMMERCE

AI helping e-commerce businesses get closer to their customers. With the facilities of AI, e-commerce platforms today are able to utilize large datasets regarding customer behavior and usage patterns. Artificial intelligence self-learning algorithms can create personalized shopping experiences for online buyers. Following are highlights on AI powered e-commerce:

1) Real-time product targeting

E-Commerce Companies aim to offer their customers a best offline shopping experience to the online space, by offering the consumers a hassle-free way to discover the products they are looking for. Machine learning can help to present online shoppers with personalized product recommendations, discounts and offers.

2) Visual search

Image recognition platforms can help e-commerce websites visitors search by image, instead of text, and match relevant products to specific images. One example of the visual search is Pinterest's visual search which enables users to select an item in any photograph online, and then ask Pinterest to display similar items using image recognition software.

3) AI based hiring processes

HR departments can use AI technology in many ways. For example, the task of screening applications, reaching out, scheduling face-to-face interviews, and finding matches can be automated through Restless Bandit, software as a service product. This reduces the work of HR by providing the potential candidate for the job.

4) Voice Powered Search

Voice is slowly replacing text based search in online shopping. Voice recognition accuracy is improved than before. Almost 70% of requests are natural or made in a conversational language with Google assistant. Some smart devices with voice-controlled personal assistants are Apple's HomePod powered by Siri. Another example is Amazon's Echo powered by Alexa. Alexa voice based search can be used to place an order to be shipped from Amazon. According to study by ComScore, 50% of the searches will be based on voice searches by 2020.

5) Assortment Intelligence Tool

Assortment planning allows the retailer to provide a pleasant shopping experience and most profitable product mix to the consumer. Customer changes their buying taste frequently. Retailers should focus on their pricing strategies and which product to advertise more or drop the product. Retailers have to upgrade their pricing strategies in order to retain their customer and to keep them coming back to their online website. Assortment Intelligence tool can assist retailers to have 24/7 visibility and insights into their market competitor and change their pricing accordingly to compete in the market. Retailers can analyze their competitor's product mix and prices by the tool. Some examples of assortment tools are Market Track, Competitive Intelligence Services, Aqute intelligence and wiser. Another example is Upstream Commerce. It is based on artificial intelligence, data mining, semantic analysis and image recognition. Data from retail websites is gathered and analyzed using product-data extractor and site-crawler. The data is then analyzed by matching engine and analytics engine.

6) Conversational commerce

Chat software can help the shoppers make purchases in a conversational text format using natural language processing. Chatbots are already being used to facilitate online transactions for the big brands, with TacoBot (Slack) and H&M (Kik). Famous brands like Tommy Hilfiger launched a Facebook Messenger Fashion Chatbot during the New York Fashion Week 2016. It was the first brand to sell their collection through Facebook Messenger. Examples of some chatbots based apps are given in the table:

TABLE II
CHATBOTS

Area	ChatBot Name	Platform
E-commerce	Operator	iOS
Education	Duolingo	Android/iOS
Medical	Babylon Health	Android/iOS
Wine & Dine	Reserve	Android/iOS
Finance	Chip	Android/iOS

7) Customer Service

AI can influence customer service through the use of chatbots. Chatbots are computer program developed for conversational commerce. Chatbots interact in natural human language to give the customer a personal and satisfied customer service. Chatbots give marketers the ability to interact with the customer in real time and learn about the customer needs and deliver specific prescriptive guidance and results. The idea of bots has been introduced around the '50s and '60s when Alan Turing and Joseph Weizenbaum invented the first "chatterbot" program, named Eliza. Examples of chatbot in India are Eva, HDFC is AI-based banking chatbot in India. It can answer customer queries across multiple channels within no time. Yatra company facebook messenger chatbot in the Indian online travel sector is another example of better customer service. This intelligent chatbot helps the customers search for flights and book their flights directly from their facebook messenger.

8) Virtual personal shoppers

Virtual personal shopper can assist the people in making the smart decision about their shopping, for example Flipkart launched a messaging service called Ping. Ping has worked as a shopping assistant until shutdown on 2016. It was powered by artificial intelligence to assist customers to quickly discover the items they were looking for. Amazon's home assistant, Alexa is also artificial intelligence enabled virtual personal shopper assistant. It provides the customer modern shopping experience and only needs to verify your voice pattern to process the order. Other example of the shopping assistant is Mona. Mona is an Artificial Intelligence powered mobile shopping assistant provides the customer an expert assistant. Mona learns from the styles customer likes, his ideal shopping point and his favorite brands.

9) Virtual Assistant

E-commerce virtual assistant is a software agent skilled in business support services and technical services. It can also perform tasks or services for an individual. The term "ChatBot" can also be used to refer to the virtual assistant. Recently Lenovo has also announced its virtual assistant to compete with Google now and Cortana. CAVA assistant is based on AI-powered deep-learning .It has the face and voice-recognition features

that assist in managing data and other events. Some e-commerce tasks that virtual assistant performs are:

1. Good customer service

2. Order processing

3. Exchanges /Return

4. Order processing

5. Website maintenance

10) AI fake reviews detection

Customer reviews have become important for consumer trust in the online shopping. According to Dimensional Research's recent study, 90 percent of respondents said that positive online reviews influenced their buying decisions. But, fake reviews can affect the buying decision.AI can be used to manage this problem. Amazon also uses AI to combat fake product reviews. Amazon's AI machine-learning system ensures that only verified customer purchase reviews are boosted. It also gives preference to those reviews that are marked as helpful by other users.

11) AI based sales process

Integration of AI with the customer relationship management system is an effective solution to manage sales. This AI enabled allows a CRM system to answer customer queries, solve their problems and even identify new opportunities for the sales team. The customers will no longer be offered products and services that are inappropriate for their online shopping.

12) Customer-Centric Advertisements

Artificial intelligence programs can be created to deliver customer-centric advertisements.

Other areas where AI can be implemented in e – commerce is

-Product categorization

-Customer segmentation

-Sentiment Analysis

-Predictive merchandising

VIII. CONCLUSION

According to Forrester, India is the fastest-growing e-commerce market [9]. AI will have a significant effect on the way e-commerce businesses attract and retain customers. AI revolution in e-commerce will create plenty of new data science, machine learning and engineering.AI based e-commerce will also generate IT jobs to develop and maintain the systems and software that will be running those AI algorithms. But the confluence of AI and e-commerce may impact people lacking in-demand skill set face unemployment in coming years.

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