ARTIFICIAL INTELLIGENCE (AI) CONTRIBUTIONS TOWARDS BUSINESS INNOVATIONS

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Abstract - We are in the era of human-machine collaboration. Artificial Intelligence, Business Analytics and Internet of Things are the buzzwords. Machines have started simulating 'human intelligence' and top companies in the world have started focusing and investing their R&D efforts on Machine learning and Artificial Intelligence. Irrespective of the Industry, Artificial Intelligence is employed extensively as it increases efficiency, reduces cost and solves complex problems in no time. Gartner in its press release on Global Artificial Intelligence dated April 25, 2018 forecasts the business value derived from AI will reach $3.9 trillion in 2022. The report also states that Customer Experience, Cost Reduction and New Revenue Generation are the three major sources of business value delivered by AI. Artificial Intelligence is predicted to be one of the most promising technologies of the future. AI emerging as one of the prominent technologies is driving innovations in various business sectors. In this paper, the evolution of AI, its role in driving innovations in five business sectors and the predicted future of this technology is discussed from Industrial Perspective.

Keywords: Artificial Intelligence, Machine Learning, Business Innovations

I.   INTRODUCTION

Till 2016, businesses were focusing on digitalizing and automating their business operations [1] to the maximum possible extent. Robots and machines were built to automate repetitive tasks. But today, the business environment is perceived differently. 'Machines doing repetitive tasks' are not considered to be adding business value and 'Machines with Intelligence to understand and learn by itself' are given utmost importance. There is a surge in Artificial Intelligence technology and products as it adds business value and helps improve efficiency and reduce cost. AI is driving innovations in various business sectors. This being the business environment, this paper discusses the role of AI in driving business innovations.

The paper is organized into five sections. The first section gives Introduction to AI. The second section discusses the various phases of AI Evolution and the third section positions AI's role in innovations. The fourth section elaborates the influence of AI in driving innovations in five business sectors which includes Automobiles, Banking, Education, Healthcare and Sports. The fifth section forecasts the future of AI in the next decade.

II.   A PROLOGUE TO ARTIFICIAL INTELLIGENCE (AI)

Artificial Intelligence refers to the capability of machine to think and act like humans. The word 'Artificial Intelligence' was coined by John McCarthy, one of the "founding fathers" of AI in 1955[2]. Artificial Intelligence is a term that encompasses several related technologies like Robotics, Neural Networks, Fuzzy Logic, Speech Recognition Systems, Face Recognition Systems, Language Translators, Genetic Algorithms and Intelligent Agents [3].

Gartner forecasts that AI class of technologies has the potential to deliver big business benefits in the next decade [4]. Many Companies have started investing their R&D efforts in the area of AI. Some of the prominent companies include Google, Microsoft, AIBrain, Apple, Amazon, Intel [5] and so on. The notable innovations employing AI include Google's Self Driving cars, Amazon's Echo, Apple's Siri, Microsoft's Cortana, Softbank's Pepper – The Emotional Robot [6], etc,

III.   PHASES OF AI

The evolution of AI is typically divided into three stages as below [7]:

Stage of AI	Duration	Characteristics
Artificial Narrow Intelligence (ANI)	<2016	Intelligence restricted to only one functional area
Artificial General Intelligence (AGI)	2016-2050	Intelligence in par with humans
Artificial Super Intelligence (ASI)	>2050	Intelligence surpassing humans

Today, we are slowly entering into the AGI Phase of AI from its Infant phase. As AI is the future, job opportunities related to AI has emerged in the recent years and students/professionals have started equipping themselves on AI. Some of the opportunities in AI include AI Business Development Managers, AI Enabled Healthcare Professionals, Human – Machine Collaboration Managers, Transparency Managers, etc.,[8]. Three categories of new jobs in AI given by Forbes include Trainers, Explainers and Sustainers [9][10]. Understanding that 'future is AI', some of the MOOC platforms like Udacity, Udemy, Khan Academy, Coursera, etc., have started offering online courses on AI[11]. Research giants like Forrester [12], IDC [13] and Nielsen [14] have also acknowledged that the AI is one of the significant technologies driving innovations and future of business.

IV. POSITIONING AI'S ROLE IN INNOVATION

Innovation and Operational Excellence are two Key focus areas to succeed in business. Innovation refers to changing or creating processes, products and ideas [15]. Innovation adds business value [16]. One way of categorizing Innovation is based on whether the Innovation is focused on current market or new market as Sustaining Innovations and Disruptive Innovations [17].
Sustaining Innovations focuses on Current markets and their requirements. Disruptive Innovations focuses on creating new markets/customers. Artificial Intelligence is disrupting the existing market and its role in Innovation can be categorized as 'Disruptive Innovations'.

V. AI'S ROLE IN DRIVING BUSINESS INNOVATIONS

Today, it is witnessed that AI is influencing all the business sectors. As AI is one of the promising technologies of the future and helps improve efficiency, quality and reduce cost [18], it was looked as a tool for competitive advantage by companies in the last decade. But now, AI has become a competitive necessity and companies which are not investing their R&D efforts are perceived to be out of the race in near future. Some of the business innovations employing AI include the following:

Automobiles:

One of the significant sectors under the influence of AI is the Automobile Sector. Prominent Innovations in this sector include Autonomous Cars and Automated Parking [19]. Google, Tesla, Mercedes Benz are working in this area. According to McKinsey [20], some of the other areas in which AI has profound impact in Automotive Industry include Less Equipment failure, Robot-human Collaboration to increase productivity, Quality Inspection, Forecasting Supply demand and Smarter Project Management.

Banking:

Some of the areas of AI Innovations in Banking Sector include adoption of Chatbots in Customer Service, personalized payment services, Fraud detection, Enhancing Security, financial services, Risk Analysis, voice assisted banking, etc.,[21][22]. Some of the chatbots [23] available in service include SBI's Intelligent Assistant SIA, HDFC's Intelligent Robotic Assistant (IRA) & ICICI's chatbots iPal. Axis Bank has launched its Conversational Banking application enabled by AI and Natural Language Processing help customers to perform their banking transactions at ease.

Education:

Intelligent Tutoring Systems (ITS) is one of the finest AI Innovations in Education [24]. Carnegie's Mika, Pearson's iTalk2Learnsystem16 [25], AutoTutor [26], why2-Atlas [27], etc., are examples of Intelligent Tutoring Systems in adoption today. Other notable innovations [28][29] include Automated evaluation, personalized learning, Virtual teachers/chatbots, Smart content programs, etc., It is forecasted that AI will have considerable contribution in the future of education - Education 4.0 which focuses on 'the way it is taught' than 'what is taught'[30][31]. Some of the popular teaching robots or companion robots include Miko, Asus Zenbo which are highly useful for senior citizens and children with special needs [32]

Healthcare:

Autonomous Surgery or Robotic assisted Surgery is one of the greatest innovations in healthcare taken to the next level by Artificial Intelligence [33]. Some of the companies involved in this space include Intuitive Surgical, Hansen

Medical, Corindus Vascular Robotics, etc.,[34] AI is also assisting healthcare in maintaining digital health records, drug discovery, medical diagnosis, prescriptive analytics and predicting outcomes[36][37]. IBM WatsonPaths [38], Google Deepmind Health, 3Scan, Atomwise, DeepGenomics, etc.,[39] are some of the companies working on AI. It is forecasted that AI health market will grow at CAGR of 40%   [40]

Sports:

As like other sectors, intelligent and responsive standalone chatbots are widely used in Sports [41]. Some of the popular chatbots include Ask Fred for Wimbledon fans, Microsoft's Bing Sportscaster, Sky Sports Jeff Bot, etc., Sport Coaches are supported with AI driven data analysis and predictive analytics to take decisions and improve coaching [42]. Many promising startup companies like Sportslogiq have started working on sports related AI technologies [43]. Interestingly, Goldman Sachs tried to predict victory of FIFA 2018 using the AI System along with UBS and Alteryx [44].

VI.   CURRENT STATE OF AI ADOPTION AND FUTURE DIRECTION

India is currently in the 'Learning Phase of AI'. Government has recognized the importance of AI and NITI Aayog (National Institution for Transforming India) are formulated the National Strategy for AI [45]. The primary focus of government has to employ AI to solve societal problems and it has recommended a two-tier approach to continue AI research in India. The first tier, CORE (Centre of Research Excellence) will concentrate on knowledge aspects of AI and (ICTAI International Centre of Transformational AI) will concentrate on developing and deploying application based research by coordinating with industrial player. Experts focus that in another 3 to 5 years, AI eco system will be built in India and NASSCOM (National Association of Software and Services Companies) is already opened Centre of Excellence (COE) for AI and data science at Bengaluru [46]. Hyderabad is slowly developing as the training hub for AI/Data Science. In India, the current focus of AI applications is in three sectors namely Agriculture, Healthcare and Education [47]. Industries are skilling their employees, AI courses are included in Curriculum by Education Institutions and individuals are acquiring AI Skills. Government is encouraging AI Startups and many pilot projects are initiated. This being the current scenario in India, White House recognizing AI is the transformative technology of future has convened a meeting with Tech giants to get the maximum benefits for America [48]. Similarly, Britain is planning to invest $1.4 billion in the AI Industry and the European market planning to invest $1.8 billion by 2020.

VII.   CONCLUSION

AI is transforming the world and its applications are felt in almost in all the industries. As the emerging technology of future, AI is driving numerous business innovations. As like any other technology, though there are downsides of employing AI as rightly pointed out by Elon Musk and Bill Gates [49], AI is going to be the future and we should be ready to witness the world of human-machine collaboration in the coming days.

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