Artificial Intelligence: A Disruptive Innovation for Businesses in Pakistan

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Abstract

In the new era of big data and Industry 4.0, artificial intelligence is the main force driving industrial progress and a key factor in fostering the integration of cutting-edge technologies such as blockchain, cloud computing, and the Internet of Things. This paper studies a thorough assessment of artificial intelligence and deep learning from 1950 to 2020 to measure artificial intelligence's impact on Pakistan's businesses. In this paper, a systematic literature review is conducted on various research papers, books, and magazines to understand better the impact of artificial intelligence on businesses in Pakistan. The analysis will cover several features of artificial intelligence, such as its development, its uses in various fields, and the future of artificial intelligence in business in Pakistan. Thus, this paper will help businesses in Pakistan by providing knowledge and helping them adapt to artificial intelligence for future growth and development.

Keywords: Artificial Intelligence, Industry 4.0, Technologies, Internet of things, Blockchain, Cloud Computing.

1.1 Introduction

Researchers have improved computers' capacity for independent learning for over 70 years, starting with developing computers that needed human manipulation in the 1950s (Ertel, 2018). This advancement marks a turning point in computer science, business, and society. In a way, computers have developed to the point that they can finish new tasks independently. In the future, artificial intelligence will communicate with humans using their native language, gestures, and emotions to adapt to them and learn from them. People will not only live in actual physical space but also remain in the digital virtualised network due to the popularity and connectivity of various intelligent terminals. The lines separating humans from machines in cyberspace will be blurred (Garvey, 2019). Artificial intelligence can be defined as any theory, method, or technique that enables machines to examine, replicate, exploit, and investigate human thought processes and behaviour. It is the computation and intelligent calculation of data. Artificial intelligence is the study of characteristics of human activities, the creation of a specific intelligent system, the application of software and computer hardware to visualise the underlying theories, approaches, and techniques of human behaviour, and the ability to make computers perform tasks that only humans were able to do in the past. For 70 years, artificial

intelligence has expanded to include a wide range of natural and social sciences fields (Pickover, 2019). However, Pakistan faces various challenges in adopting artificial intelligence, ranging from lack of awareness, limited availability of data, and lack of skilled professionals. Thus, to resolve the issues in the adoption of artificial intelligence, there is a need for investment in the field of artificial intelligence by the government and businesses in the country (Bibi, 2019).

1.2 Research Problem

The research is mainly conducted to measure the problems related to the development of artificial intelligence and its implementation in Pakistan.

1.3 Research Objective

The study's objective is to provide knowledge and a framework for businesses in Pakistan related to the implementation of artificial intelligence.

2. Methodology

Research methodology for artificial intelligence and its impact on businesses in Pakistan includes conducting a thorough analysis of the development of artificial intelligence and an analysis of industry trends and the future of artificial intelligence. Various research materials on search engines such as Google Scholar have been explored for this study. Through this method, it was found that there are hundreds of books and articles on artificial intelligence. After sorting out various books and articles, the systematic literature review included around five books and fifteen research articles. The systematic literature review of the books and articles will help gather knowledge about artificial intelligence and how it can help businesses in Pakistan (Cresswell & Clark, 2017).

3 Literature Review

The literature review on artificial intelligence is based on three stages: the development of AI, AI in Practice, and the future of AI.

3.1 Development of Artificial Intelligence

The early phase of AI development lasted from 1950 to 1980; the industrialisation phase lasted from 1980 to 2000, and the explosion period (2000–).

Between 1950 and 1980, AI underwent its first significant advancement, but at that time, it was solely applied to learning English, proving geometric theorems, and solving algebraic application problems.

AI experienced a resurgence due to the availability of more powerful computers and advances in machine learning algorithms. Expert systems were replaced by neural networks and other machine learning techniques that could learn from data and improve over time. This led to the development of practical applications of AI in areas such as speech recognition, computer vision, and natural language processing (Baryannis, Validi, Dani, & Antoniou, 2019).

The second significant period for AI development was from 1980 to 2000. The Japanese government started developing fifth-generation computer software and dedicated a sizable sum of money to assisting AI. The objective was to build machines facilitating picture identification, translation, and human-machine communication. These advances enabled the development of intelligent systems that could reason and learn from complex data sets, paving the way for applications in finance, healthcare, and transportation (Di Vaio, Palladino, Hassan, & Escobar, 2020).

The third significant advancement in AI occurred between 1993 and the present. As a result of Google's AlphaGo defeating world champion Li Sedol, some of the most famous outcomes of artificial intelligence were made visible to the world thanks to IBM's Deep Blue win. AI technologies like speech recognition and picture identification have been integrated into everyday life for regular people, especially in recent years with the growth of the Internet, graphic processing units (GPU), and big data. Since IBM "Deep Blue" defeated Kasparov in a game of chess matches in 1997, the technology has attracted much attention, but there has not been much progress in the underlying theory (Kurzweil, 1999). The amount of computing power available worldwide has increased tremendously due to the distributed computing theory and accelerated development of network information technology. Since specific AI applications have surpassed expectations, the subject of AI is once again a hot one in all spheres of society (Vinuesa et al., 2020).

3.2 Artificial Intelligence in Practice

After automation, electrification, and Information, AI has emerged as the pillar of Industry 4.0. Agriculture, autonomous driving, education, banking, government, intelligent robotics, the medical industry, manufacturing, retailing, and security are just a few fields where AI has made revolutionary technological advances.

3.2.1 Artificial Intelligence in Agriculture

Agriculturists now have a fantastic opportunity to combine cutting-edge industrial and information technologies when designing and constructing agricultural facilities, which will help us progressively accomplish the aim of industrialising, customising, and personalising agricultural output. AI creates a

method equivalent to human intelligence by simulating intelligence, successfully combining principles, human knowledge, and experience, researching numerous issues in agriculture using high-speed computing, and putting the findings into practice. The appropriate nutrient level of the soil, the type of crop fit for each plot, and other preliminary analytics could be carried out by AI before planting crops. In the past, they could only be acquired via years of experience, and it was impossible to optimise the advantages without the backing of objective scientific evidence. Crop production can become more productive and profitable with the help of AI. AI may be used to remotely and autonomously farm livestock and poultry. Farmers can record the activities of animals using a remote HD camera. Picture analysis software assessed each animal's health and physical condition. Farmers can also gather data using detectors and wearable tech before uploading it to the cloud server. Farmers can quickly recognise enormous amounts of data calculated by algorithms and grasp coping mechanisms to address prospective issues (Talaviya, Shah, Patel, Yagnik, & Shah, 2020).

3.2.2 Artificial Intelligence in Autonomous Driving

Robotic systems are used in autonomous driving. Perception, control decisions, and path planning are the key technologies. The foundation is intelligent perception, and the last two pieces of content rely on the study and use of artificial intelligence (AI) and related technologies. Deep learning is the current successful method for optimising driving behaviour in autonomous cars. Large volumes of data are produced due to the various traffic conditions and unforeseen circumstances that moving cars encounter. This data is transmitted back to the cloud platform to give training examples. After extensive training and learning, one would get driving experience and the outcomes of other cars' training and learning. Meanwhile, several obstacles to autonomous driving include technical problems, expenses, rules, and legislation (Yaqoob, et al., 2019).

3.2.3 Artificial Intelligence in the Financial Industry

Digital financial services have been made possible by deploying Artificial Intelligence in the financial sector. As a result, the entire banking sector has gained additional development vigour. Many people know the potential uses of Artificial Intelligence in the financial sector. AI adaptation takes place over time. The use of AI significantly impacts the evolution of the financial industry. AI is a service for the financial sector and an analysis of financial data. AI may increase the detection, early warning, prevention, and control capabilities of many types of risks in the financial system and provide users with pleasant, convenient, and safe services. AI also provides decision support for credit, transactions, and financial analytics (Ashfaq & Ayub, 2021).

3.2.4 Artificial Intelligence in Education

The integration of AI and education at this time resulted in significant changes to the nature of education, from Artificial Intelligence education to educational Artificial Intelligence. The idea of collaborative, people-oriented education is the primary focus of the curriculum. Objects used in education can be both people and machines. Educational Artificial Intelligence research objects are transformed into educational activities and rules for both machines and people. To overcome technical constraints, get back to the core of education, and be directed by the idea of synergy, educational AI is characterised as using AI to comprehend how learning happens, how many external circumstances influence education, and then constructing environments for learners. Intelligent teaching platforms, intelligent robots, and intelligent assessment systems, which spare teachers from laborious teaching and provide human-computer collaborative teaching, are just a few of the innovative applications born from the marriage of AI and education. Intelligent network learning space is the ultimate goal of educational AI with the combination of AI and education. Through collaboration with the government, educational institutions, businesses, and other multi-party intelligent network learning channels, education would continuously enhance teaching methods and foster the development of inventive, communicative, and learning skills. Education materials become more dynamic and open, the teaching model is more intelligent, and the learning mode becomes more individualised (Chen, Chen, & Lin, 2020).

3.2.5 Artificial Intelligence in Governance

The early applications of AI were in fields with abundant data resources and well-defined scenarios. The discipline of intelligent governance is still in its infancy, but because of AI's growing popularity, it offers a wide range of potential applications in areas including virtual government assistants, intelligent conferences, document processing, robot process automation, and decision-making. Thanks to AI, government service and efficiency will increase, which will also help with the labour shortage (Sharma, Yadav, & Chopra, 2020).

3.2.6 Artificial Intelligence in Manufacturing

The application of AI and manufacturing integration has raised economic and manufacturing productivity and made up for increased production flexibility, labour shortages, and reduced costs. Mass customisation, better supply and demand matching, more precise market forecasting, the promotion of manufacturing service transformation, and enhanced manufacturing quality control. Complex system engineering is encouraging the deep integration of Artificial Intelligence and

manufacturing. Developing and using compound skills, information security, Internet technology, and the standardisation of AI are only a few of the issues and difficulties that all nations face. Intelligent plants, intelligent supply chain management, intelligent management and service, intelligent monitoring, and decision-making are examples of intelligent products and facilities (Liu et al., 2022).

3.2.7 Artificial Intelligence in the Retailing Industry

In the distant future, machines will assist customers rather than employees when they visit convenience stores to check out products online. The virtual assistant will provide acceptable suggestions based on the customer's purchasing preferences and past shopping history when customers do not know how to evaluate online products. A checkout counter is not necessary for the new store Amazon Go. The operation of conventional convenience stores and even supermarkets is threatened by Amazon's newest intelligent convenience store, which employs some of the most cutting-edge purchasing innovations. The model incorporates computer vision, sensor fusion, and deep learning techniques. The benefit of AI for the retail sector is the realisation of a genuine consumer experience with products. With AI, the retail sector can undergo additional adjustments, including those that should be made before consumer consumption as well as during and after the actual consumer buying process. A shopping website keeps track of the user's preferences after each action. Customers can use handy services and receive a unique or personalised experience. For instance, intelligent customer service, delivery, and payment systems (Weber & Schütte, 2019).

2.2.8 Artificial Intelligence in Healthcare

The combination of medical science and intelligence through Artificial Intelligence recognises the successful alliance of medicine and technology (Yu, Beam, & Kohane, 2018). Numerous health records are created using modern networking technologies, particularly the widely used Internet of Things (IoT) technology. To gradually gather information, it can realise the relationship and interaction among physicians and patients, hospitals, and medical devices. Technology and medicine can work together to make the medical procedure digital, electronic, quick, and accurate. For instance, NLP for electronic medical records, deep learning for gene prediction, and image identification and visual technologies for radiology (Garvey, 2019).

3.3 Future of Artificial Intelligence

Technologically, AI is anticipated to accelerate the three types of developments such as platforms, algorithms, and interfaces.

At the platform level, most AI depends on computers as representations of computing hardware. The primary function of a typical computer's core CPU is general-purpose computing. Its performance is generally subpar, even though it complies with all the clever tasks that AI faces. The creation of high-performance platforms for AI is currently popular. IntelligentIntelligent processing technologies, like GPU, have been developed by well-known businesses such as Intel, Google, NVIDIA, Cambrian, and others. The GPU will replace the CPU as the calculating and computing terminal of the future. Future AI will unavoidably deal with various clever tasks with sinister prerequisites. Future trends heavily favour the development of new computing architectures based on various processors to realise intelligent platforms (Hennigh et al., 2021).

The algorithm exemplifies the AI's behavioural style. Even when powered by the most cutting-edge computing platforms, AI systems can only be compared to intelligent but unsophisticated individuals lacking efficient algorithms. The development of algorithms for everyday intelligent tasks has been a key component of the area since the concept of AI first emerged. Clever algorithms may continue to be at the centre of AI development. However, unlike in the past, artificial intelligence (AI) currently takes many forms and is used in many aspects of our daily lives. There are ever-greater linkages between the social and material worlds (Talib, Majzoub, Nasir, & Jamal, 2021).

Deep learning is a key factor in the advancement of AI; however, it is now more concerned with data processing than with the development of cognitive abilities like logical reasoning and memory or with predicting and storing information sequences. Forecasting and storing content that includes information sequences is required to handle difficult real-world jobs. To advance the evolution of deep learning, the latest model has been created with high expressive capabilities and is simpler to evaluate theoretically. Additionally, to develop the best deep learning model to address particular issues. Typical data processing structures like DBN and CNN are used in speech recognition, image recognition, and NLP (Bengio, Lecun, & Hinton, 2021).

4. Discussion

Artificial intelligence is gaining much attention from the government and businesses in Pakistan due to its potential for cost reduction, efficiency improvement, and rapid decision-making. Although artificial intelligence in Pakistan is still in its early stages, there are various places where it is already being used. One specific area where artificial intelligence is used in Pakistan is the country's financial sector. Several banks in the country use artificial intelligence customer services such as chatbots to communicate with customers and rapidly resolve their queries. The chatbots used by banks in Pakistan are mainly programmed with basic information and routine inquiries related to customers' accounts.

Another field where artificial intelligence is used is the health sector of Pakistan. Artificial intelligence is helping medical professionals make better diagnoses of patients. Also, it helps them with better treatment plans by analysing medical tests such as X-rays, blood reports, ECG, and MRI. E-commerce platforms across Pakistan also use artificial intelligence to personalise customers' shopping experiences to increase their sales. In personalising the customer experience, online platforms use chatbots to give personalised recommendations to customers and improve their shopping experience (Shahid & Li, 2019).

However, there are still challenges to the widespread adoption of artificial intelligence in Pakistan. One challenge is the lack of skilled professionals with expertise in artificial intelligence. There is a need to develop artificial intelligence talent and train professionals who can develop and implement artificial intelligence solutions in various industries in Pakistan. Another challenge is the lack of data privacy laws and regulations in Pakistan. Regulations need to ensure that data collected and used by artificial intelligence systems are protected and used ethically. Despite these challenges, the use of artificial intelligence in Pakistan is expected to grow. With the increasing availability of data, the development of artificial intelligence talent, and the adoption of regulations to protect data privacy, artificial intelligence can transform various industries in Pakistan and enhance the country's economic growth (Bibi, 2019).

5. Conclusion & Recommendation

Artificial intelligence is extensively used in many industries and is the application platform for Industry 4.0, the Internet of Things, Blockchain, and big data. AI successfully supports people's jobs and daily lives while advancing a smart society's informational and automated aspects. Both the techniques and the applications of artificial intelligence have proliferated. AI will likely become more widespread and all-encompassing with the advancement of platforms, algorithms, and interaction techniques. We are starting to see intelligent financial systems, teachers, researchers, and scholars in our daily lives. The development of intelligent systems necessitates advancing conventional procedures, including human-machine collaboration.

Thus, it has been recommended that the government and businesses in Pakistan become aware of artificial intelligence's benefits and invest in it for a better future. Artificial intelligence has the potential to rapidly advance the country's information technology infrastructure and necessitate the rapid advancement of Pakistani industries from 3.0 to 4.0.

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