**ROLE OF DATA SCIENCE AND ARTIFICIAL INTELLIGENCE IN BUSINESSES**

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**Abstract**

Artificial Intelligence (AI) and data science continue to dominate all non-business and busies environments amid several criticisms due to fear that the technology of AI and data science would endanger the role of all people in business operations and future management. AI and data science have several positive impacts upon whole business operations, and business and management investment in AI would enhance market leadership and sustainability. The algorithms of AI and data science provide machines the ability in making predictions and decisions in the future by using learned insights and patterns. The new applications continue in improving decision making and efficiency and whole business operations. Business operations and management are in the era of data that shapes daily processes within business operations. This research provides a basic understanding of the role of data science and AI to create value for businesses. This paper would provide an idea about how AI and data science could be used for making businesses more successful.

# 1. Introduction

## 1.1 Introduction

Innovation has been always the major engine of an improved standard of living throughout history. The innovation process could be quite disruptive as this makes the conventional technologies absolute obsolete. Data science helps to bring together all domain expertise from statistics, mathematics, and programming for creating insights and making sense of the data (Amirullah, Aulia and Arisandy 2020). The demand for data science is quite high and explains how digital data helps to transform businesses and help them in making crucial and sharper decisions. Hence, digital data is ubiquitous for people looking in working as data scientists.

All emerging technologies through data science and artificial intelligence are changing the way people work, live, and amuse themselves. More advancement of such technologies could contribute to develop hyper-connectivity and hyper-automation that would bring Industry 4.0. This incredible speed by which AI and data science are entering all sectors is forcing the organizations in getting into a race for making their organization more profitable. It is impelling businesses, investigators, entrepreneurs, pioneers, and strategists in using AI and data science in designing new strategies and creating new sources for the business value (Benaben et al. 2019). The quick pace of data science and AI is propelling the strategists in reshaping the business models. It is fostering the integration of data science and AI within business processes; however, the consequences of such adoption need attention and are underexplored.

## 1.2 Research Context

Data science has a vital role to play in an organization. Whereas, artificial intelligence needs more application-oriented skills to create value.

## 1.3 Research Problem

Analytics of data science powers business intelligence and marketing program efforts. However, the amount of value received from the data is a concern. Here, artificial intelligence is helpful. This is from a large set of data and creating predictions as per the data (Delacroix 2020). It comprises analytics data from various areas such as CRMS, content management systems, automation platforms, and Google Analytics. According to studies, business values are estimated to reach 3.9 trillion dollars by 2022 through AI.

## 1.4 Research Question

**RQ:** How does data science apply with artificial intelligence to create value in businesses?

## 1.5 Intervention

It has been essential to understand how the introduction of AI at the business level is making things simpler. Also, it is to be analyzed how it is helping them to expand and grow. Here, the key issue lies in the nature of the predictive model of the solution. For becoming actual AI, a productive model requires learning and development from its various predictions (Chergui, Kechadi and McDonnell 2020). Predictive analytics from data science indicates that machines predicted as per data and prescribed things to be done further.

**Interpretation 1:** The area of AI is yet to be explored, whereas data science has already begun to make a huge difference in the market. Through interpreting the growth of AI, new products are generated that are bringing autonomy through automatically performing various things.

**Interpretation 2:** Through interpreting data science, data can be analyzed as per business decisions as AI is implemented to provide value to companies.

# 2. Background

AI and data science are the major technologies when this is about the products and processes with the automatic optimization and learning to be used within the industries in the future. AI and data science are the main technologies not in the daily lives of people and have several applications, like voice recognition and facial recognition. Innovation and adaptation are quite essential to organizations (Drobot 2020). The development must lead to sustainable development with the use of new technologies. AI and data science are all rising technologies that might create winners and losers all over the business world. However, in the last couple of years, this situation has dramatically changed, almost all fields employ these technologies. Several factors are responsible for it that includes advancement in computer technology, increase in transparency by code sharing, and a huge number of open-source software. Huge uses of such technologies in all fields that include healthcare, sports, security, agriculture, energy management, automobiles, environmental monitoring, gaming, and finance are changing the way people live, amuse themselves and work (Ebadi et al. 2019). The advancement of data science and AI is the center of this enhanced performance of other technologies. AI technology and data science offer several opportunities that could lead to a notable transformation within business and the whole economic system.

Behind every application of the real world, there is the intelligent agent (IA) that reacts with the environment in the repetitive cycle for sense think and act. This explores all input data for learning correlations, detect similarities, discover good depictions, and extract features at several levels. Earlier, the unavailability of efficient hardware and data was hindering the progress of data science and AI. Although, in the last couple of years, the accessibility of low-power and low-cost sensors has resulted in the production of a large volume of data (Earley 2017). The investigation of lists of the data providers is done for elucidating accessibility, diversity, and the number of datasets that are available on the web.

## 2.1 State-of-the-art of Artificial Intelligence

Despite some setbacks, there is AI due to the development of neural networks with several hidden layers. Such advancement of artificial intelligence is attributed to several major factors, such as tensor processing units and hardware accelerators, and the availability of a huge volume of data. An increase in the popularity of artificial intelligence has led to the expansion in investment in several sectors of artificial intelligence that include production, marketing, development, and research (Fatima et al. 2018). Several organizations are making this technology available commercially in form of application program interfaces (APIs), professional and personal agents, libraries of deep learning, robots, and chatbots. It is enhancing the business valuation that adds new resources and makes the services and products intelligent.

At the same time, the paradigm shift motivated by AI is enhancing the intuitive, analytical, and mechanical skills of all employees and shaping all other contexts of businesses. With the increased amount of funding, artificial intelligence could involve in many more sectors. Hence, this becomes necessary in investigating the functioning of AI systems in several possible sectors within existing businesses (Gibert, Andreu and Castell 2019). This is important also to inspect all market leaders and all start-ups adopting such AI systems. The adoption of AI by the organizations would lead in shaping of these business contexts. Prior knowledge about the domains would make society aware of the adoption and development of artificial intelligence in the future. It would aid also policymakers to identify the challenges and explore the ethical and legal corners in this field of artificial intelligence.

## 2.2 Reshaping the process of innovation with data science and AI

AI and data science have reached the place where this could take financial decisions of the real world, chat with the people, work with them, and play games against humans. Behind every application of the real world, there is the intelligent agent or AI system. This interacts with the environment in the repetitive cycle of the sense think and act. This takes in data from the environment, takes the informed decision based upon experience and input data, and performs the action that affects the environment. The IA could be a software agent or machine (Kandasamy, Raji and Arun 2018). This takes data in form of text, sound, images, and videos, and analyzes the data with the use of algorithms of AI. The unprecedented amount of data is fuel for the AI system. The major currency of the business would be the ability in converting the data into artificial intelligence that drives several competitive advantages.

Data unavailability was hindering the progress of artificial intelligence. Although, in the last couple of years, the accessibility of low-power and low-cost sensors has resulted in the generation of a huge volume of data. Data from all sensors such as camera, smoke sensor, a global positioning system (GPS), motion detection sensor, health monitoring sector, and chemical sensor could be processed continuously or could be stored for gaining useful insights by several mechanisms (Khan and Alla 2021). Data from several sensors could be combined using the technique of sensor fusion. Also, there exist several other sources through online directories, surveys, review sites, census databases, actual sales of retail, online communities, and commerce websites from where data could be extracted by using web scraping techniques. All raw data that is obtained from the sources could be used and processed for training the intelligent agent.

The conversion of raw data to the processed data is a time-consuming and expensive task. After training the intelligent agent, this could teach all other agents and also make them much smarter. Data is fuel for machine learning; however, the data might be expensive, rare, slow, or risky. In such cases, the machines could create synthetic experiences or could share experiences for one another for augmenting or replacing data (Lai et al. 2020). Machine teaching would same power and time as for all small changes it would eliminate the need for training the agent from scratch. Such knowledge transfer in agents could increase the deployment and development of intelligent agents at a much quicker rate.

The intelligent agents explore input data for learning correlations, extracting features, detecting similarities, and discovering good representation at several levels. It needs the use of tools of AI and data science such as decision trees, support vector machines, Bayesian algorithms, and deep learning networks (DLN). DLNs are the most used approach in the last couple of years. Few of these DLNs are reported surpassing the human-level accuracy in specific tasks. For the speech data, RNNs and CNNs are preferred (Latif et al. 2020). The hype and success that is generated by the DLNs in the last couple of years have propelled several organizations in launching a huge number of AI-based services and machines. Several organizations invest in AI, collect appropriate data about the customers, services, products, and acquisitions. The data is analyzed for gaining knowledge about the commercial availability of intelligent services and machines. Artificial intelligence and data science have attained efficient growth regarding deployment, innovation, and research. A notable achievement is to surpass human-level accuracy within several tasks through classification, recognition, and games. It offers several opportunities for product innovation and process innovation; however, the issues such as security, privacy, trust, and bias need attention still. These are a few of the issues that are compelling to think about all the negative impacts of AI.

## 2.3 Strategic Objectives of the organizations

The achievements in the field of innovation and research have propelled several existing organizations in becoming AI organizations and also have spawned AI-based start-ups. It has increased also the involvement of the actors in AI-related academic events and research. The actors are adopting several other strategies for business growth in the field of artificial intelligence and data science by recruiting AI talents, acquiring AI start-ups, and investing in more AI organizations (Lu et al. 2019). Such an increase indicates that the corporate organizations aim in growing quicker with the most advanced technologies of data science and AI. The investments made in AI should have played crucial roles in the financial growth of the organizations; however, this wasn't possible in conclusively finding the direct correspondence among the organizations as there could be several factors behind this growth.

As start-up is considered as growth and innovation drivers of the economy, this would help in detection of impact of AI and data science on the business models. The inclination of the start-ups towards such organizations indicates that such industries would create much more opportunities in the future and also provide improved services and products by enabling the automation of several tasks. AI is used maximally in these five industries, such as healthcare, core AI, cybersecurity, sales and marketing, and business intelligence (Manjunath and Hegadi 2018). The adoption of technology of data science and AI has led also to shape the business contexts. There are several business contexts identified that are influenced by data science and AI and this is called the third dimension of the three-dimensional analysis of the overall impact of data science and AI on businesses.

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