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An exploratory study of AI and Big Data, and it's future in the United States

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Abstract—Artificial intelligence (AI) refers to the technology involved in the development of smart machines and software. This includes the developments of applications and systems that can reason, collect intelligence, prepare intelligently, learn, interact, interpret, and manipulate objects. Artificial Intelligence provides big data users to automate and improve complex predictive and descriptive data analysis that would've been high time consuming and tedious if it was to be performed by humans. Therefore, the development of AI can have a huge effect on the role that big data plays in determining how humans work, how they communicate, and how they operate a business. Over the past few years, there have been discoveries in science and technology that didn't even exist only a few decades earlier. Data has evolved at a rapid pace, and society has reached the age of big data. Big data is a vital economic resource that has tremendous societal importance and has become very important to the public at large. Many researchers have spent a lot of their time studying big data. Computer network technology, originally used only as technology in the 1990s, has transformed people's lives, simplify things for human existence, and evolved towards artificial intelligence. Artificial intelligence systems allow computer networks to improve performance as compared to an era of a non-AI network system. This paper will focus on exploring artificial intelligence in the context of the big data era as the research object, understanding its application in computers and computer networks, and its future in the united states.

Keywords-Artificial intelligence, Big data, ICT, Data mining

I. INTRODUCTION

Big Data is composed of complex data sets that can include expanded datasets and social media data. The granularity of data offers insights into the expected actions and their effect on the surrounding environment. Since it is an intelligent computer, AI can learn and adapt in a way that traditional computers were not able to and can perform better with more data [1]. This new software could be used in several different ways to help in the decision-making process in various sectors. Technology has been around since the dawn of time; The Big Data industry has sprouted up over this century. In an attempt to capture all important developments within a specific market, a vast volume of data started to be collected. But, when the word "Big Data"

was coined, the industry itself, and the data itself, were so large, that it was very difficult to interpret — much less put to good use [1]. The use of computers by IT professionals and computer scientists soon discovered that the task of going through the massive amount of data, decoding it (in a format more conveniently interpreted by a computer), then analyzing it to improve business decision-making processes would be too much for human brains to handle. If artificial intelligence algorithms were to be developed, they would have to be created to be able to draw insights out of such chaotic scenarios.

As the world evolves towards digital life, data are produced from different sources. We have to process a great amount of data for these sources to be useful for society and take advantage of these data for developing society [1]. It offers an evolutionary advancement in many fields of research that focus on collecting large data sets. In short, a large "data set" which is made up of thousands or millions of parameters must be gathered and processed, which inevitably takes up a very large amount of computing resources. Quantitative (or quantitative) experts especially those who have mastered business analytics, and those well versed in data science are expected to increase in demand, as more businesses and hospitals start to implement or expand their data analytics and artificial intelligence capacities in the future to catch up or handle the volume of data generated by computers, smartphones, and IoT devices. The advancement of AI and big data in operations has helped the world economy to prosper in terms of increased productivity as well as other economic benefits [2].

II. Research problem

The research problem in this paper is to understand how AI and big data work together in transforming various operations in terms of technological advances of handling massive amount of data. The paper opens a horizon on developing solutions that will address the challenges in AI and big data analysis. Although there is a range of technologies that are being built and deployed to enhance user performance and business in general, there is a high likelihood that artificial intelligence (AI) and big data will play a big role. In this paper, the fundamentals of artificial intelligence and big data are introduced and explained within the contexts of technological advances. There will be a discussion on how AI and big data work

together in processing large data sets to extract insights and make the correct decisions based on the findings.

III. Literature review

A. How AI is used in big data.

Online businesses are gathering data that is just as tangible as physical data. It involves consumer information that includes their likes and dislikes, shopping patterns, as well as individual preferences. Social networking accounts and online profiles, "liked" and shared content, customer reviews, social activity, loyalty/rewards applications and services, and tagged preferences all add up to potentially informative data to the Big Data pool. The availability of data from multiple sources allows the AI to build a wealth of knowledge which will eventually assist inaccurate predictions about the consumer based not only on what they bought but also on how much time they spent in a particular section of a site or store [2]. A host of other pieces of data synthesized by AI can add to, ultimately discovering what the consumer wants. Many researchers like tools that work well with data analytics, due to AI's capability to synthesize data making AI and Big Data appear inseparable. AI learns from all of the data it is being fed and using those inputs to create new guidelines for future business analytics. There are issues when reporting data that loses consistency because it is bad data.

Creating efficiencies from data is a major issue for AI as well as translating science and research into commercial business value. An Artificial Intelligence (AI) system needs to obtain information from data to be able to perform its purpose [2]. Unfortunately, companies are hampered in their ability to combine data from different sources to reach a clear conclusion about their consumers. As AI becomes more advanced it will solve the issues related to data collection and analysis faster. Before running an algorithm or program, there must be an agreed-upon approach for (mining) the data, structure, and representation of the data passed through a machine learning approach or deep learning approach.

B. How big data and AI operate together.

Big data has only been getting bigger and more complicated over the years. Organizations (like banks), particularly those that are making machine learning/AI components their core tech, are realizing it is the desired state that is advantageous to work in. Big Data and AI are inextricably entwined. The former will be useful if implemented correctly, while the latter depends on the former to be successful. The ability to make smarter decisions and take better risk control will replace the time, talent, and effort required to handle and process various activities [3].

Big Data and Analytics have not been fully explored because they are still very much large and are still in the process of being implemented by various organizations. A lot of the big data and AI associations will require a much larger infrastructure than today, and the governance of such a system will prove a bigger challenge than the system we have today. At the same time, there is a possibility that AI and ML technologies will be a vital part of how businesses and organizations handle such organizational complexities [4]. To provide that kind of insight into the company or ML problem, one must have a very good grasp of the subject matter.

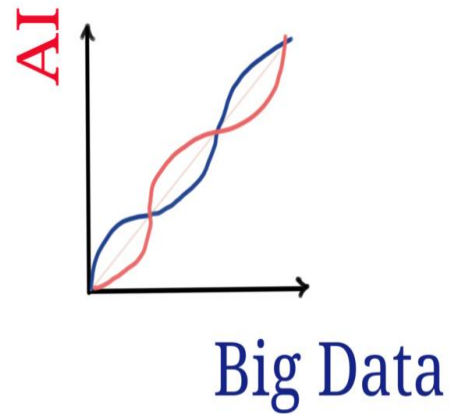


Fig 1: The relationship between AI and big data

C. The Big Data Cycle

The "Big Data Cycle" is the standard collection of core tasks that involve the capturing, storage, and the use of data analytics, with which a great deal of present-day life is associated. Big-data is an area that deals with ways to process, evaluate and efficiently obtain information through, and otherwise interact with, data points that are too complex and multidimensional to be handled in a conventional spreadsheet software system. The process is a basic command and control, centrally managing big data from a variety of sources. Commonly, the cycles flow in a left to right manner with iteration [5].

1. Data Management

Data management can be described as a process that involves collecting, verifying, storing, securing, processing, and modifying the data to make sure that is readily accessible, reliable, and guarantee its timeliness for multiple users. This is a more complex process attributed to the rise of the speed of data (near real-time) as well as additional sophistication of the collected data, and the more complex activities it needs. This condition has caused significant progress to be made in the field of computer systems and inspired people to never take these systems for granted again [5,6].

Artificial Intelligence can assist in this process by doing things like allowing for customized suggestions based on machine learning, and by using real-time data to improve the experience for the users. Artificial Intelligence (AI) can also aid in the identification of information from data streams via NLP categorization and relationships capture. Self-learning systems can display static or in motion videos to discover and handle new information [6]. AI help identifies and learns by observing human system or computer interactions and also do what it learned in less than an instant. Remote communication can be done either at the cloud edge or via an IoT Network. AI can also be paired with other algorithms to support us spot "black swan events" which can be utilized in updating the previous strategies.

2. Patterns management

Companies need to track their vital signals on the news and the others on the economy to keep in touch with how the world is doing and what they would expect their markets and stakeholders to do in the future. [7] Although typically an agile strong business will constantly search for trends that present opportunity and risk, and then take appropriate action, unfortunately, most companies are reactive, unable

to deal with evolving threats because they are too busy reacting to changes when they occur. All kinds of companies need to continuously search for "patterns of interest" that would inform them of what might happen, and later, would confirm, the presence of external risks to act independently or to undertake measures that are already "identified and processed" for implementation.

Artificial intelligence can help by identifying a wide variety of anticipated and unanticipated signals, occurrences, and trends that can lead to earlier diagnosis of cancer. Once integrated with analytics, artificial intelligence can learn and reveal the potentials of the answer in additional detail [8]. AI also can identify and learn the mechanisms to trends, decision challenges, and the need for additional actions. There are numerous cases in which an opportunity can be found to provide quicker and better results.

3. Context Management

The utility of data collected also changes in light of the context in which the data is interpreted and the results this data may be applied to. The content of data may mean anything distinctly different within each context over another [9]. Extracting relevant information from data is critical to understanding the dataset itself. Knowledge and the relationship between the world inside and the world outside will contribute to an understanding of the context. This enables for the classification of data in context, specifically regarding other contexts and study/research uses, since big data sources could include several contexts and connections in it.

Artificial intelligence (AI) can facilitate the complex computer processes which use "subject areas" of data with one context [10,11]. AI can learn the subtle variations and context-specific distinctions to follow the development of the data's interpretation in various contexts, whether the AI is "able to interact" with the user or not. NLP applications typically have several forms of representation grids that can be used to view communications and human interactions.

4. Decision Management (DM)

DM has all the facets of designing, developing, and maintaining the automatic decision-making mechanisms that a company uses to handle them internally and externally. The decision-making program has a high impact on how a company conducts its business to become an efficient and successful decision-maker [12]. Organizations rely on prescriptive, descriptive, and predictive analytics using big data to provide the support that drives the setting. Artificial intelligence (AI) can play an important role in fueling information and skill use in a constantly developing and dynamic environment [13]. Artificial Intelligence (AI) will help in scaling key resources such as data/big data to a staggering pool of big data which is rising at a rapid pace to address both business objectives and applying its functionality to an ever customer expectation. More precisely, growing the use of AI in human interactions would be a major contribution to enhancing user experiences and enhance the effectiveness of resolution regarding consumer complaints. The use of artificial intelligence may also make recommendations on where to check for decision options, analyze and forecast the results of decisions, and effectively track output against key metrics.

5. Action management

Action Management is a process of making plans and organization of work activities and actions of all humans, bots, processes, applications, and technologies utilized by a business. The main aim is to organize, arrange, and

orchestrate any activity, and designing project plans as requested by superiors [14]. All of these items promote desired results defined by objectives in line with established values and agreed on guidelines. The tracking of these activities is used to enrich the big data pools for any further study and possible optimizations to maximize freedom levels by eliminating several restrictions brought on by the other objectives.

AI will analyze these activities and try to associate them with the previous decision steps. It would be prudent to pick an inventoried action from one of the activities in the inventory, to modify any of the rules/parameters of an inventoried action, or to recommend the development of a new action that is not consistent with the current inventory [14]. Artificial Intelligence can be incorporated in each of the measures or specific tasks that are executed in the chosen actions. AI is an important part that helps to track and evaluate the actions and behaviors of managers. AI, alongside the algorithms, will pre-test future modified behavior before implementation, thus giving a quantitative assurance that the desired outcome has been achieved.

6. Goal management

Goal management involves the practice of identifying and monitoring targets to provide input and direction, help assess success and give suggestions to all assets for performance improvement. It also includes the field of "people-pleasing" and optimization. As organizational technology providers move to use increasing volumes of empowerment software, dynamic network web bots, and edge computing, the interest in self-directed target attainment grows [14]. New ratings and scoring procedures that promote greater autonomy involve the aim of enhancing results by evaluating progress against the target. Artificial Intelligence will help direct autonomous humans, process snippets, bots, applications, and scalable infrastructures via the automated modification of targets that keep track of edge conditions.

7. Risk management

Risk management involves the identification, assessment, and priority setting, mitigated by organized and smart use of resources to reduce, manage, eliminate and control risk impacts. This will include the use of the Big Data Pool to track occurrences continuously and recognize emerging problems and threats. AI may support organizations in the identification and response to the occurrence of situations. In incidents, trends, system logs, and personal input (such as social networking sites) for possible or emerging threats, important trends and inconsistencies can be detected [15]. Furthermore, every attack or problems in the periphery, like cultural behavior, can be identified early and appropriate protection measured can be facilitated.

D. The current landscape: Big Data and AI

There are various applications of big data and artificial intelligence in different sectors. The automation of industrial works is considered the ultimate signal of modernization by industrial professionals. The best way to view the current and future of the Big Data and AI world is to identify the current applications and effects of the technologies. Big data and artificial intelligence have up to now impacted several various sectors.

1. Healthcare

A large amount of data is flooded every day in the health care system. The only challenge is that there is no established infrastructure capable of making sense of and using these data. This is why the use of large-scale data and artificial information in health care is now an important way to strengthen the existing health industry. However, most

healthcare institutions use this data to enhance the type of therapy that patients receive [15]. Data obtained by healthcare providers are not only used to practice medicine appropriately but also in medical science and clinical research. It not only promotes healthier, data-driven options for healthcare practitioners, it also helps people receive better personalized medical services. The tremendous AI capabilities in the healthcare sector involve the use of smart wearables, chatbots, and medical applications.

2. Big data and IA: the magic of finance

In the banking and finance sector, there are certainly many applications for AI and big data. A good example is fraud prevention. Large data are used to evaluate customers' spending preferences and to understand the set trends. Anytime transactions are outside a certain set pattern are made, the transaction is flagged as suspect and alert both the bank and customer [15]. The early identification of fraudulent activities undoubtedly secures the customer's bank experience more than ever before. Besides, cybersecurity technologies have been consistently applied and enhance regularly to improve the security of customers. Another use of Big data and AI that are important in the financial sector is financial forecasting. Bigger companies and today's consumers use Big Data and Artificial Intelligence as their forecasts Tools to evaluate and advise on how to spend money and achieve the best returns. This use of AI and big data not only enhances customer experience but also contributes to continuous financial growth.

3. In the insurance sector, big data and AI

Until now, the greatest problem facing the insurance industry is the inefficient use of relevant data. The data generated by insurance companies all over the world can be utilized to provide customized service, pricing, and targeted services that can enhance the customer experience. To analyze and identify trends within collected data, insurance firms today use Big data Analysis to offer more and more customized client services. In such situations, the analytical system is used to pick the data and to identify the unique insurance criteria for consumers of various age groups [16]. And the AI system is then equipped with the data and helps the customer with personalized solutions that suit their needs. The analysis shows that consumer data can be obtained from two sources - customer online activity and sensor data. In the insurance sector, the use of big data and artificial intelligence also has many ongoing challenges like any other sector. However, research has shown that insurers use programs based on AI to enhance the experience of their customers.

4. Big data and AI in the eCommerce industry

AI and Big Data is a vital component that is used to offer greater customer service and eco-commerce experience by the eco-commerce sector. Customer satisfaction is the biggest influence of Big Data and AI in eCommerce [17]. Every time a customer visits an online shop to check for a product. The store will clearly remember their tastes utilizing the AI approaches and shows them the product in advance, thus reducing the need to look for it in the store. The online shop owners also have support from big data analysis in real-time, which allows them to make better decisions that can enable their business to grow. For a seamless shopping experience, the data on consumer demographics, shopping behaviors, and spending patterns can be used. The streamlined shopping experience will only be enhanced in the future with the improvement of big data analytics and AI technology [17].

IV. ITS FUTURE IN THE UNITED STATES

The future of AI and big data in the United States will involve the increased use of the skills in various sectors of the economy. Cloud computing will be a popular option in many sectors especially business and healthcare as the increased amount of data will need to be handled using AI capabilities. As the industry expands, there will be a high demand for data scientists and chief data officers to handle data analytics, and ensuring the security of data. The United States will also grow in the number of automated devices especially self-driving vehicles which use sophisticated sensors, radar systems, and AI software embedded in AV. The healthcare system will be revolutionized as more AI and big data technologies are integrated with diagnostic imaging, virtual nursing, robot conducted surgery, diagnosis, and improved patient logistics.

V. CONCLUSION

The implementation of Big Data and IA in schools is still in its early stages and is currently limited to technical and analytical problems. The integration of advances in data science and IT is nevertheless is very promising to revolutionize research, education, practice, and business. In this paper, I have identified the context, key principles, and recent developments of this fast-growing AI and big data. The integration of artificial intelligence and big data has surprisingly enhanced the way organizations interact with their information and clients. Business intelligence, data analytics forecasts are most influenced by AI and Big Data. Loyal clients are crucial to every successful organization which is why every company has introduced AI into its Big Data to remain competitive. AI and Big Data are among the most revolutionary ideas in the modern world. With the increase of global data on an exponential scale, Ai technologies are closely tracking behind the scene, the far-reaching impacts of which have become even more apparent on a day-to-day basis. Over the years, AI and Big data have increasingly developed faster and the future comes close to applying both technologies in each sector. In the future, the AI and Big Data capability will be known, of which we cannot even imagine. The future usefulness and effect of AI and Big Data are unknown. We expect that we will have a brighter future, which will put AI and big data in the right amalgamation.

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