



AI in information technology and its future in the United States

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Abstract—Artificial Intelligence is an extensive concept that covers many principles in Information Technology. This study will explore the concept of artificial intelligence, how AI and IT work together, the impact of AI in information technology operations, and its future in the United States. AI is the backbone of many technological advancements including computation, software development, and the transfer of data. Artificial intelligence can also be applied in technologies like, speech recognition, automation, and biometric identification are of technology that uses AI. AI covers a wide variety of sectors, including the healthcare industry, the assembling and manufacturing businesses, corporations, and the automobile industry among others. In many industries, AI also has different benefits that make it more common. The AI-powered computer performs multiple tasks simultaneously; it is inexpensive and reliable and effective as compared to human beings. There are also some issues with AI, which undermine its use. In case the user does not understand the AI system, AI is vulnerable to technical problems and security snags or data problems and can cause accidents. Broader use of AI has changed different industries by improving the efficiency of the enterprise and making data security better.

Keywords: Artificial intelligence, Information technology, Computing, Big data, Facial recognition

I. INTRODUCTION

In the age of industry 4.0, AI has gained its prominence by strengthening the field of information technology (IT), seeks to transform the IT systems towards intelligent systems which revive AI significance in the IT sector [1].

Since computers, data transmission systems, and software are all part of information technology, AI will play an important role in this field. AI is becoming an identity that, in various industries, represents the future technologies and their implementations. In this paper, we address how AI is applicable in information technology, as well as its developments that can assist the IT sector to build new quality-assured systems.

The future is becoming more and more dominated by AI [1]. IT can equally be found in many industries, and AI concepts are often applied in industries that rely on information technologies. In a decade or so, AI technology has been part of our daily lives, especially its use in intelligence research, speech recognition, automation, and facial recognition. AI is transforming how various sectors run their operations daily. The traditional methods of computing have been replaced by artificial intelligence transforming how businesses operate and carry out their daily activities [1]. Leading AI transformed everything in a very short period, from research and development to streamlining finance and healthcare systems.

AI market is projected to be \$190 billion by 2025 as per the statistics. By 2021, worldwide investment in cognitive and AI technologies is expected to be \$57.6 billion, with 75% of business applications using AI technology. AI is anticipated to increase China's GDP by 26.1% and the GDP of the United States by 14.5 percent by 2030[2].

At the local level, 83% of businesses have established that AI is a strategic priority, whereas 31% of innovative, marketing and IT experts are thinking of investing in AI technologies during the next 12 months. Likewise, 61% of businesspeople point describe AI as their most relevant data venture in the future. Additionally, around 95% of the

managers who are trained to use big data have adopted the use of AI technology [2].

Global artificial intelligence market s



Source: www.grandviewresearch.com

Fig i: Global artificial intelligence market share

II. RESEARCH PROBLEM

The research problem I will try to solve in this paper is how artificial intelligence has been integrated into information technology and its significance to the United States. The elements that will be addressed in the paper include the importance of AI in IT, its impacts, if artificial intelligence can replace IT, how AI and IT work together, and its significance to the United States. To understand these elements, a literature review will be conducted to understand the topic in detail. It is important to note that research gaps still exist on how the operations of the IT industry have been smoothed by the adoption of AI and related technologies. In short artificial intelligence can be described as a computer science component that aims to make machines smart, which perhaps could not be done without direct human involvement. Using computer-based training and AI algorithms enables AI to be used in building systems that replicate human behavior, solve difficult and complex problems and develop more simulations to reach human-AI levels [2].

III. LITERATURE REVIEW

A. Importance of AI in Information Technology

Artificial Intelligence has emerged in an era when cyber threats are on the rise. Today, many industries and business organizations implement Artificial Intelligence to protect their data and information systems against unauthorized intrusions [3]. Within the field of computer science, Artificial Intelligence often defines different concepts. AI focuses on developing computers that, like the human brain, can think and execute various tasks. In the manufacturing, assembling, and commercial sectors, engineers are working on developing robots to support the two industries. By assembling items using the Artificial Intelligence concepts, the robots help in providing information and performing various functions.

In Artificial Intelligence, programming also has an essential purpose, since the different machines utilize computer programs to convey information and perform various tasks [3]. As time passes, Artificial Intelligence is getting more complex. Apart from the many benefits, AI also has drawbacks that could impact the population of the world in the future. It will be important to discuss why AI is becoming beneficial to the human community, the challenges, and how the future human society will be influenced by its prominence.

B. The Impact of Artificial Intelligence in Information Technology

The digital transformation and implementation of AI technologies have led to the discovery of new methods to address and simplify many of the key problems in the IT industry. AI is at the heart of what is done in every industry, and for IT professionals, it remains at the center of information technology and applications [4]. The integration of artificial intelligence into human work has reduced the burden on the IT industry by improving efficiency, boosting productivity, and improved quality. If the production and implementation of IT systems were next to impossible when done without a computer engineer's support, then this is now possible thanks to AI's advent of AI's sophisticated algorithmic functions.

1. Enhanced quality assurance

To determine the quality assurance of a product during the developmental cycle, it is crucial to ensure that the right tools are in use as they are developed [5]. It is a fact that technologies such as AI can help software engineers use better tools when it comes to fixing different bugs and errors within the apps and modifying them automatically during their development cycle.

1. Increased Automation occurs.

A good example of how AI has an impact on information technology is the concept of automation in robots. A robot is efficient in doing routine tasks with minimal (or no) human intervention. While using artificial intelligence in IT applications, IT departments will take big steps in automating backend processes that can allow various efficiency gains and reduce the requirement of human hours that are needed for these tasks. AI-powered methods will improve with time as the algorithms of the methods learn from their mistakes [5].

2. Better Secure Systems

Data security is very important to ensure that our phone numbers, emails, passwords, financial accounts, and all other important details are secure. A customer's or company's data, such as credit card numbers, passwords, or other confidential data must be protected and stored by the government and private organizations at all times to prevent its loss to attackers in the IT industry [6]. The use of advanced algorithms and making use of Artificial Intelligence will provide a required level of defense to create a high-security layer inside all of these applications and IT systems. Artificial intelligence is a helpful framework that can help businesses to detect and prevent future data breach attacks, and provide the required guidance to avoid any other potential vulnerabilities in the already existing IT system.

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4. Better Application Deployment During Software Development

Different stages are involved in the software development of various products. Developers will need to take into consideration these stages to maintain quality assurance of various applications [7]. The software versioning control greatly impacts the ongoing development

of the software. Since advanced artificial intelligence is all about the prediction of potential issues, it becomes a highly useful tool for detecting and predicting major issues during this stage. Therefore, it can be prevented and/or repaired without any significant hiccups, ensuring that developers would not have to wait until the final stage before enhancing the app's overall performance [8].

5. *Enhanced Coding Efficiency*

Artificial Intelligence also encompasses a variety of algorithms that can be integrated into an information technology system directly to support programmers when it comes to finding and solving software glitches, as well as when it comes to creating a code [9]. Some AI technologies have been used to provide feedback when it comes to coding, and this has helped to enhance the performance of the developer, which has resulted in cleaner code, in turn improving productivity, and offering a bug-free coding setting. After analyzing the structure of the code, the AI system provides valuable feedback. It not only improves the overall productivity but also significantly reduces downtime during the development process [7].

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7. *Better Server Optimization*

A lot of requests are sent to a web server to be handled by the hosting server regularly. Whenever users come up against "restrictions", the Web server must open up pages that are requested by the users. Some servers have a high number of requests, and so some of them often encounter unresponsiveness [10]. As a result, they slow down over the long term. Artificial intelligence resembles a human brain since it can respond to a hosting service by optimizing its operations to increase ROI. As the need for IT advances, AI will be constantly used to incorporate the IT staffing demands to provide more smooth connectivity between the present business structures and technical functions.

C. *Why businesses must implement AI*

Organizations can use Artificial Intelligence in a variety of different ways, not just by getting it incorporated into their operations. One of the main reasons for enhancing business processes is to change and optimize the systems to increase efficiency [10]. For instance, AI can be utilized by a company to transfer automated reminders to the teams, departments, and customers of the company. It can also be used to track network traffic, as well as manage a wide range of boring and tedious activities that would, otherwise, take up a lot of people's time. This will save up a lot of time and resources that these workers can spend on, and instead focus on more important aspects of the company.

Another benefit why businesses should implement AI is to enhance the personalized customer experience. AI provides more value by coming up with relevant recommendations, helping users in finding products, answering questions based on their feedbacks. Artificial Intelligence in IT, can be used by companies to bring together vast volumes of data, which can contribute to building strategic insights and coming up with business intelligence that might have, otherwise, not be realized.

Over 84% of companies believe that AI would help them achieve and/or retain a competitive advantage in the long run [11]. Early adopters of this technology agree that with the use of this AI software, they will be able to move into new businesses and projects, particularly because many

are still unsure how this tech will grow further. A significant number of tech leaders are now satisfied with AI because it ensures greater efficiency, generates new jobs, and boosts business in several ways. According to a survey conducted on some executives on Artificial Intelligence, 79 percent of respondents believe that AI will make their jobs more productive and enable them to work on simpler tasks or at a higher level [11]. Only 36% of respondents think that AI will free up their employees to contribute to more innovative tasks.

However, even businesses that have seen the advantages of artificial intelligence may find it difficult and unfamiliar to implement. In reality, across the entire sample of executives, only 37% of executives state that the biggest challenge in anticipating AI in their company is that the managers may not understand AI technology works [11]. Fortunately, using Artificial Intelligence combined with the IT department would make it a lot easier to navigate AI integration.

D. *Can AI replace IT?*

Organizations typically object to the introduction of a fully-intelligence AI because they believe it will make many of their workers irrelevant and will trigger a decline in the overall workforce. The idea that humans will be replaced by robots is not unfounded because some tasks are better handled by robots to analyze massive data sets. However, industrial automation and the Internet have resulted in many work categories being automated [12]. This has opened up new, often unforeseeable, job opportunities. Several tasks are now performed by both humans and robots. A super-intelligent AI is often used to perform certain activities quicker and more efficiently than the human brain ever could. This is true because the AI machines do not require regular rest time.

From the viewpoint of the job-losing technological advances, it is important to be conscious this isn't the first time in history where technology has contributed to the elimination of many jobs. In the past, new jobs were created for workers who lost old jobs. Occasionally, the jobs created have been in areas that did not even exist before [13]. Artificial Intelligence (AI) is moving in a similar direction to where computers were before the personal computer era. The emergence and proliferation of the technology must be referred to as a phase similar to the advent and advancement of personal computers. It is because of the increased use of Artificial Intelligence that there have emerged a large number of new occupations and fields as well.

Although they are powerful and still far away from taking over, IBM's machine learning tools are still a long way to being close to human intelligence and emotional capacity. The reason Information technology must encompass Artificial Intelligence is that it works as a compliment and not as a replacement of roles done by IT departments. These days, most see this as a threat to the entire trucking sector like self-driving trucks. Both former CEOs of Uber, and the new CEO of Waymo, said that they believe self-driving cars can never overtake humans. It is because of these very good reasons that this type of technology will never be able to manage all the traffic experience [13]. When it comes to any unusual circumstances, such as adverse weather conditions or serious traffic jams, human drivers are best suited to drive a vehicle than Artificial Intelligence. In addition to self-driving vehicles, many elements of Information Technology will always involve human input and therefore can't be replaced by Artificial Intelligence. Instead of focusing on how technology can potentially be used to maximize overall business efficiency, businesses should concentrate their

efforts on workforce development challenges that will lead to the success of their business.

E. How artificial intelligence and information technology work together

The use of artificial intelligence (AI) in software development and testing is not only limited to these areas, but it can also be used in collaboration with different information technology (IT) processes.

i. Utilizing AI in Service management

Computer intelligence, or Artificial Intelligence, is very commonly used in the service industry. When using AI for service management, businesses can exploit their resources more efficiently, resulting in quicker delivery and a cheaper price in comparison to manual approaches. Owing to its machine learning capabilities, AI will give IT organizations a form of self-resolving service desk that will enable them to evaluate all of the input data and also provide users with proper recommendations and possible alternatives. AI would be able to track and analyze user activity to be able to provide feedback and have tools at their disposal to assist with question interaction, customer support, and management of different goods and services. In other words, AI allows users to provide and access their personal information more easily [14].

AI can be used to build computer vision technology which can be used to interpret sequences of videos, images, PDFs, and texts that are automatically understood using the M.L. algorithms, bringing to life the human vision. It is a phase of neural development that results in an ability to see the world at a pace of images and information faster and more accurately. With the latest trending technologies of machine learning and deep learning, AI systems may be able to collect data from the requests sent to a service desk [15]. The Artificial Intelligence (AI) will find out all of the pending requests and match the ones that have been recently resolved to those that are pending to provide an instant evaluation of the request.

ii. AI for IT Operations (AIOps)

Artificial Intelligence and other technology, such as Mobile Sensing, Computer Vision, and Machine Learning, are being utilized to build Robots and web crawlers for IT operations. Technical developments in healthcare are primarily due to a mixture of Machine Learning and Big Data. These programs help automate data analysis and decisions making using both past and virtual information. In simple terms, the outcome of applying utilizing AIOps is a continuous review that will provide insights and enable the continuous implementation of improvements and enhancements of IT technology [15]. The AIOps utilized can combine service management, performance management, and automation to meet its primary goal and be considered as a continuous improvement of information systems.

In the past few years, the prominence of AIOps has been rising due to the numerous benefits it offers. Among the many factors causing this today is because our world is made up of even more sources of information, and on top of that, things have changed so much over the years that now the number of controlled systems has risen than it was before [16]. Technology has become complex to both experts and IT experts, making it difficult to perform the functions required to keep up with all the systems.

iii. Artificial Intelligence in Business Process Automation.

One of the main advantages that AI offers to the IT industry is that it is very systematic. Artificial Intelligence (AI) is becoming more and more integrated into any field of work [16]. This allows a significant part of work to be performed by computers without any human involvement. The ability to use deep learning systems would allow IT

departments to automate most of their operating processes, minimizing long term expenditures and minimizing a lot of redundant tasks. While it may not be the ultimate solution, AI algorithms are programmed to learn from past experiences, which means that they are constantly improving themselves.

Although artificial intelligence has improved software development for decades, an AI system is predicted to run and handle software for itself, being able to mainly interpret most, if not all intend of a code [16]. If the code causes issues with the system, or if it will be discovered that it has defects or inconsistencies, AI will repair it in real-time with minimum human intervention. Artificial Intelligence will also achieve a stage where it will simplify the process of routing and maintaining company networks. It will be capable of understanding the patterns that are generated with the network fingerprints while being actively using the AI system. By using Artificial Intelligence Technology, IT businesses would be able to automate many of the traditional tasks in other niches. AI will support in running and maintaining computer systems, and will, thus, lead to all other modes of computation.

iv. AI in fraud detection.

The introduction of advanced fraud detection technologies has made it easier for businesses to detect fraud. With all of the cyber-related events that have gone on, this has also exacerbated the avenues in which malicious hackers are scamming people. Most companies will use a multi-layered method in fraud detection, which typically includes statistical data analysis and AI. There are many Artificial Intelligence techniques used in fraud detection [16]. Although humans cannot do this alone, machine learning can analyze huge quantities of data at a much faster pace than humans can.

It can also be made to become quicker and more reliable over time. Machine-learning techniques can identify patterns of fraudulent activity by looking at past data that involved similar incidents. Machine learning tools can be trained to search for behavioral patterns to better identify fraudulent activities from similar instances [17]. The IT department will have the data which was collected from the cyber intruders and will be able to take the necessary action against them and create more protective measures in the future.

IV. SIGNIFICANCE TO THE U.S

One significance of artificial intelligence in information technology in the United States is the enhanced security systems. The United States currently faces increased threats from its enemies especially cyber-attacks on its systems [17]. The vigorous integration of artificial intelligence in most sectors and the federal government will be important in securing confidential data. Companies based in the United States especially social media sites store tons of data that have been constantly misused by outsiders to influence the U.S democracy. With a layered security system that is integrated with artificial intelligence, these companies can use advanced algorithms to identify potential threats and data breaches. U.S businesses will also benefit in terms of productivity when AI is integrated into information technologies. The software industry will grow faster given that AI aids programmers to create better codes faster and overcome software bugs. AI provides suggestions to programmers to increase their efficiency and productivity of bug-free codes [17].

As technological advances develop, artificial intelligence will begin to change the way healthcare is administered. By enhancing the operations of health centers and medical institutions, AI can also make things affordable and lead to more savings altogether. One forecast from

McKinsey estimates the savings on medicine and pharma could hit as much as \$100 billion a year [17]. The real effect will be on the treatment of patients. The AI-integrated system will offer physicians, pharmacists, and nurses a better access to medical records. It will give drug developers better access to the information required to come up with more customized therapies and drug protocols.

The U.S law enforcement will also benefit in the way they uncover illegal activity and solve crimes with the use of artificial intelligence. Facial recognition software is becoming more popular. While the new legislation on privacy would also impact law enforcement's use of AI, it will also allow the government to find out how to use it efficiently by learning from the mistakes committed in other agencies.

V. CONCLUSION

Artificial Intelligence (AI) has been gaining a lot of momentum in the Information Technology (IT) industry and shows no sign of slowing down. As artificial intelligence becomes more advanced in its capabilities, innovations are being developed that are changing the way businesses around the world work in a way that is better for everyone. The recent surge in electronic and information technology has resulted in machines that are more intelligent, sophisticated, and efficient. At the heart of information technology lies the aspect of artificial intelligence. It is worth noting that the rocket ship or spacecraft was seen as the paradigm tool of the future through futuristic predictions early in the century. The rocket ship, however, was an Industrial Age invention — the massive machine producing enormous quantities of force. Instead of its energy thrust, the technical power of the machine is in its mobility, intelligence, communication, and complexity. It is possible to incorporate the machine into almost every human activity, ensuring better storage, coordination, and speed of operations. The way we connect, work, prepare, entertain ourselves, and even choose a partner is changing.

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