International Journal of Multidisciplinary Sciences and Arts

E-ISSN : 2962-1658
Volume 3, Number 4 , October, 2024
https://doi.org/10.47709/ijmdsa

Advancing Industries with AI: The applications being transformational include: Healthcare, powering the Petroleum industry, Handling fraud, Cybersecurity, and Conversational AI

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open access

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Article History:
Submitted: 04-12-2024
Accepted: 04-12-2024
Published: 06-12-2024

Keywords: Health care industry, oil and gas industry, Frauds, Cyber criminals, conversational artificial intelligence, Machine learning, Statistic analysis, Identity and data management, self-service automation, constant monitoring, Product Recommendation.

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ABSTRACT

Today, AI is becoming integrated into more and more sectors of human activity, providing new approaches to a number of traditional problems, and improving multiple aspects of business and industrial processes, decision-making, and customer interactions. This paper explores the applications of AI across five key sectors: health care, petroleum, fraud detection, cybersecurity, and conversational designing. Using AI in healthcare, diagnostics and treatment have been transformed together with improvement of patients' care, early disease identification and better clinical outcomes. AI is applied in enhancement of exploration, production and refinery of petroleum products in the industry while enhancing sustainability. In fraud detection, AI systems thus offer capability to analyze large datasets in real time to reduce and prevent frauds in banking and insurance industries as well as e-commerce businesses. AI in cybersecurity strengthens threat identification, supports automatic management of preventive measures, and offers risk prognosis, with improved protection measures against cyber threats. And, lastly, conversational AI is emerging in the shape of technologies such as Chatgpt that help enhance customer experience and generate content. However, the increasing number of users of artificial intelligence technologies has a number of problems related to advisor ethics, data protection, system openness, and the dynamic nature of threats. While AI technologies mature, their adoption in these industries raises important questions about ethics, security and legal requirements with a view of mainstream proper and democratic development of these technologies. Raising the question of how to advance AI in the face of its problems, the future of AI remains in the effectiveness of using it as a tool for improving technology's capabilities and for providing solutions which will make the technology more effective, secure, and more accessible in a number of years.

INTRODUCTION

Technology has taken a central stage within the commercial world, fear being Artificial Intelligence (AI), which brings sweeping changes into the ways that companies adapt alternative strategies and ways of working. ML analyzing the strength of respective algorithms connects patterns and relations arising out of big data analysis at a vast scale and speed with far better precision compared to traditional methods. This capability has opened up possibilities across domains as healthcare, petroleum, fraud detection, cybersecurity and conversational bots which have touched new heights in terms of efficiency, decision making and experiences for users. In, diagnostics, AI has caused drastic change in the healthcare system, operations, and individualized treatment [1]. These applications of artificial intelligence range from detection of diseases through images to prognosis of outcomes of treatment for patients. However, in the petroleum industry, applications of AI include using it during exploration and production, using of cost efficiencies as well as the achievement of operational efficiencies for sustainability. Such advancements affirm AI utility in handling multifaceted industrial problems, and as such a fundamental tool in the management of energy, and the care for the environment [2].

Fraud detection is another area where the role of AI in transforming the relevant field has been proved. Today's financial organizations and companies use AI models for monitoring transactions and suspicious behavior and for protecting information in real time. This is particularly important today more than ever, especially considering that more and more people are using their mobile phones and the internet to transact, including making bank transfers [3]. Similarly, in cybersecurity, the build and winning of trust is akin to the days of waving a red cape in front of a raging bull to avoid giving an attacker an inch of advantage into an organization's systems and networks. As cyber threats change and become more varied, AI takes a central function in expanding protection systems. That makes it possible for one to have timely threat identification, risk assessment and even have automated measures to deal with any breach. With the help of tools the AI can design, it is possible to analyze enormous amounts of network data, identify patterns that signal threatening actions, and stop them before they lead to large-scale damages [4].

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E-ISSN : 2962-1658
Volume 3, Number 4 , October, 2024
https://doi.org/10.47709/ijmdsa

Conversational AI talking to a user and providing solutions like Chatgpt are another classes of innovation. These emerging language models use NLP and have capacities to imitate human interactions providing solutions in areas such as customer service, writing services and even learning facilities. Making technology as a whole more easily accessible and more easily understood, conversational AI is fast becoming one of the most disruptive and revolutionary developments in human to machine communication. However, the fast deployment of AI has problems which require consideration despite having immense benefits. These controversies include; Prejudice in AI, data privacy and accountability have become a subject of discussion when it comes to use of AI [5]. The absence of well- coordinated laws and the possibility of job shift also create social and economic issues. Such challenges raise the pertinent question of what specific measures should be taken to strike a fair medium in adopting AI in the best manner possible: with all possible considerations placed in an open, integral, and integrated model.

These examples include the combination of AI with healthcare, petroleum for information discovery, automatic fraud detection and cyber threat detection, and conversational interfaces. All industries studied have their characteristics and limitations, but all can improve the results using AI systems for data analysis. Ten years from now, the application of AI shall depend on interdisciplinary cooperation and adhesion to ethical standards. This article aims at analyzing the current and potential role of AI in these core industries and problems that it faces [6]. By examining these domains, we hope to uncover how AI is more than a technological tool, but the force of change that is recasting sectors and entire communities. Healthcare is chosen as the starting point and it is indeed an area, where AI is making actual difference in people's lives and contributing to enhancement of their quality, thus giving really practical foundation for further AI advancement in industrial sphere.

AI IN HEALTHCARE

AI innovation has been adopted by the healthcare industry to enhance better diagnosis, treatment, patient services, and management performance. When using the advantages of data analysis, machine learning, and system automation, AI is effectively combating some of the biggest problems plaguing the healthcare industry, such as diagnostics and resource management and access to care services. Of all the uses of AI in healthcare, one of the most revolutionary is in diagnosis. Some of the most revealing applications of image recognition algorithms involve medical procedures, including the identification of cancer, diabetes, cardiovascular disease and many others through imaging [7]. For example, AI systems diagnose poor-quality X-rays, MRIs, CT scans, or any images relating to the human body at a faster and more accurate rate than human experts. The achievements of such capabilities are not only valuable for making more accurate diagnoses, but for identifying a problem at a very early stage, which is vitally important for the further outcome.

Another huge field that has been revolutionized by AI is the area of personalized medicine. With further knowledge of genetic, life, and clinical information, the AI technology helps doctors in drawing the right treatment in treating the patient. The use of this approach is most effective in chronic diseases, and conditions such as cancer, whereby communication responses to treatment are universal but may differ from one patient to another. It is splendidly trained to inform the best treatment since it can easily fathom how a particular patient is likely to react to a given therapy while at the same time lessening the side effects [8]. AI is also currently affecting the infrastructural aspects of the healthcare industry. AI is being adopted in several hospitals and clinics by operating it in administrative roles like in scheduling, patient's assessment, and resource management. These models can predict patients' admission and utilization of some products so institutions can plan well in their operations and expenses. Also, AI virtual assistants and chatbots are being implemented in the provision of limited patient's information, routine questions, which would take lots of time from the human providers.

AI integrated telemedicine solution has been impressively embraced well-known after the emergence of the COVID-19 pandemic [9]. Such systems allow tele-consultations so patients can receive medical consultation and medication without attending a healthcare facility. Many of these platforms also include AI-based symptom checkers, which help the patient to know their conditions and where to obtain proper help. Such has made it easy to extend health care services to the rural areas and areas with scarce health facilities. Another revolution is involved in the use of AI in drug discovery. The conventional model for drug creation and discovery entails enormous costs and longtime spans that might take several years before a particular drug is-produced. This process is expedited by AI since it's able to comb through huge volumes of data that would take a lifetime for human beings to go through then come up with potential drug candidates, how effective those drugs are and even model clinical outcomes [10]. For instance, throughout the COVD-19 pandemic, AI was critical in recognizing new compounds for the vaccine, saving time on the research process. However, the advance implementation of AI in healthcare has its drawbacks also. There are many problems to knowledge mining, and one of the most important one is ethical, for example data privacy together with the ways implemented in algorithms have to be ethical. Records of patients have to be more guarded especially when it comes to training the AI since their data can be easily breached ad misused. Also there is a possibility of AI repeating biases existing in the dataset used during training and therefore having poor discrimination including in healthcare. Legal instruments are also in the process of trying to catch up with the burgeoning AI applications with many countries trying to put in place measures for the use of AI in the provision of health services [11]. AI is transforming healthcare through enhancing diagnosis, customization of patient care, automating operations and increasing affordability. Nonetheless, the uptake of this technology must be closely

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followed by proper ethical standards, testing, and inclusive policies too that can impact positively any division of society. With the deepening application of AI technologies, its application in the medical field in the optimization of efficiency, reduction of costs while improving the health of populations cannot be denied and signal the beginning of a new age in medical advancement.

AI IN THE PETROLEUM INDUSTRY

The extraction of crude oils and other hydrocarbon resources, one of the most capital intensive businesses and operation that undertake extremely complex tasks is transforming through the application of Artificial Intelligence (AI). Exploration efficiency, operational optimization together with environment concerns are among some areas that AI through combining big data, machine learning and automation is trying to solve. This revolution is enabling the entities in the petroleum industry to increase efficiency, cut costs, and operate safely while facing escalating competition and regulation. Big data and AI are currently providing a significant contribution to the optimization of the exploration of the oil and gas industries. Previously, exploration entails reviewing large complex geological datasets, a process that can be tiresome and prone to many mistakes [12]. Advanced machine learning algorithms can process seismic data, geological maps, and reservoir characteristics faster and with improved accuracy than any human can. These systems help in selection of prospects for drilling, estimation of reservoir future output and reduction of dry wells which in the end helps in minimizing the time and cost factor deeply involved in the whole procedure.

In production AI technologies that analyze data are used to improve the extraction process based on the data collected from oil fields in real-time. Wells and pipelines have sensors that allow field data including pressure, temperature and flow rates to flow to AI models. This analysis assists in making dynamic changes to the parameters that affect production so as optimize on the recovery of oil yet in the process, minimizing on energy usage. For instance, fewer outages in the case of equipment can be predicted by AI-aided intensive maintenance where they do not present a significant cost before they cause a failure. AI has the same effect on downstream processes and is very useful in managing refineries [13]. Refineries are big camps of processes that have to work in unison to transform crude oil to manageable products like gasoline, diesel and petrochemicals etc. These are enhanced by AI system that do the supervision of plant condition, anticipate the efficiency of plant machinery and make suggestions of the effective optimization of yields and minimization of wastage.

Furthermore, AI aids the supply chain where there are consumer demand patterns and inventory as well as logistics systems to be forecasted. These capabilities allow the companies to optimize demand supply chain which translates to lower cost and increased customer satisfaction runs. As the petroleum industry becomes under pressure to address its negative footprint on the environment, AI Company drives sustainability. AI systems can also be applied to check the emission level from the drilling sites and refineries against the agreed environmental standards. They can also diagnose and quickly pre vent pipeline leakage, or reduce the frequency of oil spillage and the ecological impacts associated with it [14]. AI is in the process of designing CCS, the methods essential for managing acids and greenhouse gases. Besides, AI models studying the structure of the Earth's crust allow selecting proper sites for the storage of the captured carbon dioxide in order to guarantee its safety and efficacy. Nonetheless, the use of AI in the petroleum sector has some challenges which we will discuss later on. One of the challenges for organizations is the difficulty of implementing AI given that many organizations have incorporated old and traditional systems which do not possess the digital framework that enables for enhanced analysis capabilities. The high initial capital that is required for the adoption of these technologies and the fact that human capital is required to manage such systems are also factors [15].

In addition, the problem of data protection and the credibility of the machine learning forecasts need to be solved to establish confidence among audience. Organization must make sure that models that incorporate Artificial Intelligence act in a more or less transparent manner, can be produced and altered with increased stability and are prepared for the conditions that are existing in the field area. The application of AI is revolutionizing the Petroleum sector through exploration, production, refinery, and sustainable development. Despite these concerns, the advantages of using AI – turning cost advantages, effectiveness and environmental impacts – are an incentive that cannot be overlooked [16]. These problems should not be taken to mean that AI will not feature prominently in the evolution of the industry in the future. As the industry progresses with the use of technology current and future innovations will cover more grounds and come up with better solutions in the petroleum sector with the help of artificial intelligence technology to improve productivity in the sector [17].

AI IN FRAUD DETECTION

Every company, be it a banking and financial, insurance, e-commerce or telecommunication, faces the problem of fraud. Given the increase in the volume of digital transactions and the increasing sophistication of fraud schemes, sole reliance on standard or conventional fraud indicators is inadequate. Artificial Intelligence (AI) has stepped up this game and come up with lucrative solutions that make it easier to identify fraud and prevent it in the future more efficiently than before. AI applied in the use of machine learning, data analysis and pattern recognition can depict massive amounts of data in real time and discover fraudulent activities with maximum accuracy. Fraud detection is one of the areas where AI-powered systems best perform as these systems are tailored to recognize the pattern and other signs of fraud accurately [18]. While rule-based systems are dependent on set rules or parameters, AI systems can use parameters with the aid of ML algorithms

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to self-improve as they work with more data. Such models can handle the rate of thousands of transactions per second to identify those that are anomalous for assessment from users [19].

Probably, one of the biggest strengths that AI has is that it can notice intertwined and often concealed fraud schemes. For instance, identity thieves always register multiple accounts or ways of interacting in an aim to dodge discover. AI systems can then link data from these sources in order to find various links and patterns that would otherwise go unobserved. It should however be noted that Artificial Intelligence or AI has now become a major pillar when it comes to fight against fraud especially in the financial industry [20]. From the details of transactions and/ or records of customers 'activities as well as the total account history, AI models know and hence can discern instances of unauthorized use of accounts, identity theft and other types of fraud in real time. Some examples of the industry include credit card companies that employ the use of artificial intelligence to prevent transaction fraud before extensive loss occurs. One of the major problems which insurance companies face, is fraudulent claims. Regular records such as historical claims, policyholders' information, and external data are used by AI systems to look for typical fraudulent sign. For instance, it issues alert when there is contradiction in accident accounts or increased Medicare claims so that insurers can probe and prevent the losses [21].

As the outcome of the demand growth for e-shopping services e-commerce is exposed to threats like payment scams, account compromises, and fraudulent feedbacks. Fraud detection softwares for use of AI track customers, payments and buying patterns in order to flag any irregularities. For instance, it can easily identify bot that would want to make multiple purchases or create multiple accounts. In the telecom sector, liberation from fraudulence in subscriptions, cloning of phones or any unauthorized access is made through the support of AI [22]. With the help of records and usage of calls as well as devices, AI models can define and alert abnormal behavior related to fraud. AI improves fraud detection in that they allow continuous surveillance and the ability to see patterns and anticipate events. While conventional techniques identify fraud activities post the event, AI systems can identify high-risk activities in advance. The essence of risk assessment in the context of predictive analytics includes analysis of historical data to identify future risks that require measures to be taken in order to prepare for them or minimize hazards [23].

However, there are challenges accompany the use of AI in Fraud detection. One of the big challenges is the number of true negatives, or in other words, instances where legal business is being reported as fraud. This will result in customers complaining and the company not getting optimal value for their money in resource utilization. Such blunders must be done in an extremely precise way so that while working on detection accuracy of models, errors do not occur frequently. Another one is data privacy [24]. Anti-fraud solutions utilize targeted consumer data as input and therefore meeting the international and regional laws such as GDPR or CCPA are imperative. Also, it is important to understand that the strategies of fraudsters are changing time by time, which means that AI systems should be designed practically perfect, to counter the new types of threats. AI has brought a significant shift in fraud detection because the solution is now faster, more accurate, and scalable. Its capability to consider big data, identify the multifaceted relationships, and learn new types of threats makes it an inalienable tool for the fight against fraud in different industries. Possible difficulties include misidentification of fraud, some breaches of data privacy, but all the advantages of using AI for fraud detection outweigh these drawbacks [25]. In the future, due to the development of technology, the relevance of AI in protecting both businesses and consumers from fraud will only increase, maintaining the level of confidence in today's, and especially in future, digital environment.

AI IN CYBERSECURITY

With the advancement of computer technology as a primary factor defining business today, security has emerged as a paramount issue in organizations irrespective of their location. New forms of threats have emerged in the form of cyber-attacks and data breaches, and complicated threats thus calling for enhanced technologies that will protect the businesses' data, their structures, and user data [26]. AI is one of the most important technologies that define the direction of cybersecurity development because it provides opportunities beyond conventional security environments. AI is redefining cybersecurity practices through the use of Proactive Server Monitoring ML, to reduce the likelihood and impact of cyber-attacks, and Predictive Threat Modeling Analytics to stop threats before they happen. AI comes into threat detection and prevention by improving the capacity of analyzing data in real time. Conventional approaches are based on the model of employing a set of rules that identify specific threats by their 'signatures,' or patterns. But these systems may be slow and of little efficiency when facing new or emerging threats, mainly due to the growing sophistication of cyber threats [27].

AI, in contrast, is best at finding new or "zero-day" threats by pattern recognition. Malware infection can also be detected by training the machine learn ing algorithms on the baseline behavior data of the network, device or user. Since AI systems can always learn the normal patterns of operations or usage of resources, it can then easily identify that a given certain time, a user attempts to login or transfer data at an abnormal time, tries to access resources that are normally not accessed, or transmits data which should not be transmitted at that particular time [28]. These are marked for real-time investigation, meaning security personnel can respond before losses are incurred. Further, AI-run systems are indeed capable of understanding threats in multiple domains at one go. For instance, AI can assist in the tracking of involvement by detecting such tempers as intrusion in the network traffic, endpoints, and Cloud systems [29]]. The capacity to perform multi-layered analysis is a much superior and real-time approach to the cyber threats when compared with the previous method of attempting individual layers of defense and then moving on to the next.

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E-ISSN : 2962-1658
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Another key benefit of using AI in the area of cybersecurity is to support its automated process of incidents handling [30]. The large number and sophistication of threats in the cyberspace environment oblige analysts to implement manual intervention, which is slow and subject to underestimating the threat and leading to a less effective protection of the assets. AI systems can perform simple security tasks like generating black-list on hostile IP address, quarantining infected computers, or applying application security update in cases of threat identification. For instance, in a scenario as DDoS attack, the AI system can recognize the attack in real time and at the same time, pinpoint the origin of the attack, and marshal protective measures for the affected systems. Likewise, whenever malware is identified, AI gets to block the compromised device and avoid its spreading across the network and thus containing of the attack [31].

They enhance timely response to security incidents since they minimize the use of manpower in handling them. This automation also helps the cybersecurity teams shift their attention to other higher value and hence more efficient tasks. Apart from real time threat detection and combating, AI plays a crucial role in predictive security [32]. Considering the information flow, the evaluation of time series data, historical, and statistical patterns, AI can predict threats and risks, which are not yet threats but potential vulnerabilities in the system. This provides organizations with the abilities to begin some proactive activities like increasing protection, fixing loopholes or redesigning security policies and procedures before an attack happens. For example, AI algorithms can identify patterns of actions of separate users, devices, and applications in the organization and, thus, mark possible insiders or stolen accounts. Therefore, predictive analytics also help to determine the risks that an organization's security system has and suggest possible improvements [33].

Today, AI allows organizations to evaluate the required extent of protection measures for their online properties, for instance, web sites, applications or databases, and the possible amount of the organization's exposure to threats [34]. In fact, practicing AI in cybersecurity, as useful as it is, brings with it its own drawbacks or disadvantages as well. Consequently, adversarial attacks against AI systems is one of the most critical matters. Hackers can exploit the various techniques being used by AI to skewed, and in effect, make the wrong predictions or fail to detect specific threats. This attack, called adversarial machine learning, is a significant threat to the efficiency of AI-based security concepts. Further, AI systems also depend on the availability of a significant amount of correct data [35]. Lack of sufficient or, in worse cases, proceeding with biased data may trigger a wrong assessment of threats or have potential loopholes in the new system. Also, the increasing sophistication of the AI algorithms themselves may sometimes present certain dilemmas for interpretation in case of the decisions made and especially in the case of a security threat. This is where AI systems are highly opaque, often referred to as the black box issue, and it could cause many problems for investigation and erode trust on systems that incorporate the technology [36].

AI is being used for improving the cybersecurity measures because it makes for much stronger defenses. Real-time threat identification all the way through predictive security to even Incident response is enhanced by AI and stands to benefit digital resources or data from cyber threats intrusions [37]. Still, problems like adversarial attacks, data quality issues, and transparency needs to be solved to maintain trusting in AI-driven cybersecurity. The application of AI in cybersecurity is an important one, which is set to become even more important as threats become more sophisticated and frequent. AI technologies, when implemented in organizations, can help keep up with new threats, prevent risks, and generally improve security of organizations' digital assets. As AI research continues and develops, the future of cybersecurity appears promising; however, cybersecurity will have to remain in step with the steady progression of finding new and original threats [38].

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International Journal of Multidisciplinary Sciences and Arts
E-ISSN : 2962-1658
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https://doi.org/10.47709/ijmdsa

GENERATIVE AI CYBER SECURITY MARKET

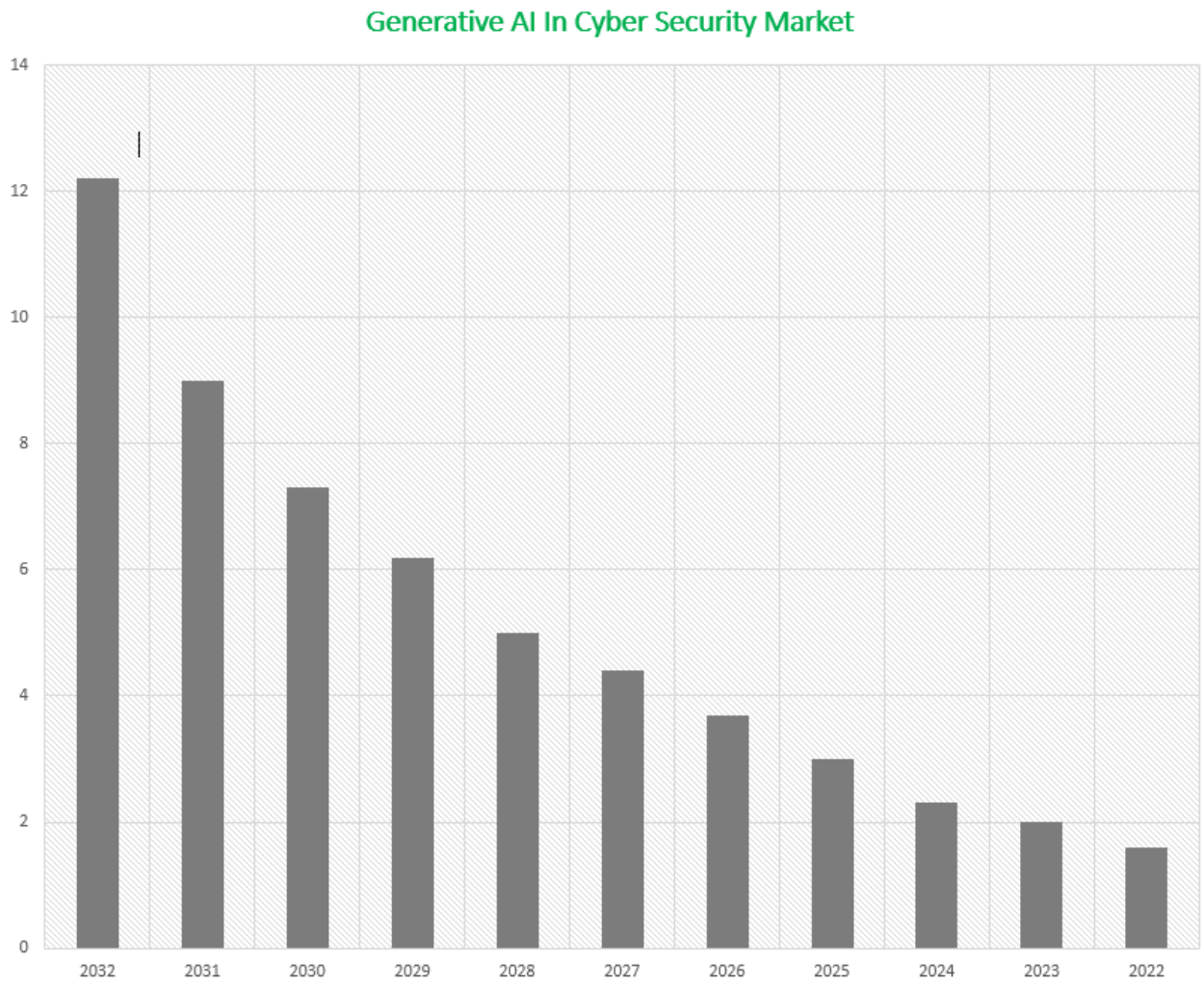


Figure: 1 showing generative Ai cyber security market

CONCLUSION

AI is currently regarded as an important driver in industries, and it has also created many advancements in some key industries including healthcare, petroleum industries, fraud detection industries, cybersecurity industries and conversational AI industries. All of these sectors are utilizing AI to solve some of the toughest pertinent problems and create value across the business value chain. In healthcare, AI has never been a hype, but the future that is reshaping diagnostics, personalized treatment, and patient care with technologies that see, diagnose, and treat diseases and manage hospital operations. But the longstanding presence of AI raises important questions of ethical usage, and data ownership and protection and liability rules which need to be taken into account in order to safely apply it to healthcare services. AI is also improving the upstream and downstream processes in the petroleum industry, as well as making such a sector of the economy more sustainable. From the application of AI to enhance manufacturing process, minimize unsafe operations, and lower operating expenses and environmental footprint, the integration of AI systems with existing structures and networks and the protection of data from breaches are the issues future focuses of AI applications should solve.

In similar regard, the use of AI in fraud is as revolutionary, where machine learning is capable of scanning terabytes of data to flag cases of fraud in real-time. From the banking sector to insurance, participants report that with the help of AI, it is easier to detect frauds with less reporting of false positives and getting predictive analysis of fraudsters' activities. This way, it is foreseen that the problems in the field of data privacy and the constant change and maturation of fraud mechanisms will always call for fine-tuning of AI systems. In cybersecurity, AI gives organizations solutions that enable them to identify and shield their institutions from cyber threats. Live tracking, deployment of automated response to various incidents, and risk prognoses are introducing quicker and more precise threat identification as compared to conventional slower approaches. However, an increased threat level of attacks and threats, as well as regards to adversarial

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E-ISSN : 2962-1658
Volume 3, Number 4 , October, 2024
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behavior and data quality, imply the constant need for monitoring and search for new solutions.
When it comes to the conversational AI, things like Chatgpt are reinventing the way people interact with computers. In terms of customer relations, content production, knowledge enhancement, and virtually all human\text end ash based activities, AI\powered chatbots and virtual assistants are increasingly applying their importance in business and customer sides. However, issues like ethics, data privacy and system openness are some of the factors that have to be meet though in the construction of Artificial Intelligence. The adoption of AI technologies is isn't only guaranteed for the future, but their applications in promoting innovation and growth cannot be neglected. Nevertheless, humanity must follow the miles' AI advancements closely and ensure that the relevant standards of ethics, practice, and openness are followed, so that citizens could reap the given technology's benefits. AI is the future when responsibly built, continuously improved, and adequately flexibly to address challenges of a global connected digital ecosystem. Promoting partnership and organization in relation to AI, it is now possible to point out the key trends of AI shaping our lives and interactions with technology.

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