



AI in Healthcare, Oncology, Petroleum, Fraud Detection, and Cybersecurity: Out of the ordinary techniques and new ideas

Ibrar Hussain

University of Punjab, Lahore

2021-pgcma-38@nca.edu.pk



Corresponding Author

Ibrar Hussain

2021-pgcma-38@nca.edu.pk

Article History:

Submitted: 04-12-2024

Accepted: 05-12-2024

Published: 06-12-2024

Keywords: AI, medicine, cancer, fraudulence, security, petroleum sector, pathology, treatment, drugs, prognosis, security, efficiency, statistical analysis, computational, analytical, applications, security, safety, prevention

Brilliance: Research of

Artificial Intelligence is licensed under a Creative Commons Attribution-Noncommercial 4.0 International (CC BY-NC 4.0).

ABSTRACT

The applicability of AI has increased in multiple industries with increasing opportunities in the areas of healthcare, petroleum, fraud detection and cybersecurity, and cancer medicine. In healthcare, it is helping diagnose ailments, treatments, drug development more effectively and quickly therefore improving patient experience. The same way AI finds application in the exploration, production, and safety of petroleum companies at reduced costs but high efficiency. In fraud detection and cybersecurity in particular, AI is increasing the efficiency of detecting potential threats, predicting potential invasions, and protecting computer networks, providing predictive shield against high risk threats. More so, deep learning is rapidly enhancing cancer diagnosis, creating tailored treatment plans, and speed up drug development to enhance the quality of therapies with better prognosis outcomes. However, current advancements suffer from the following barriers towards a general AI particularly in application; Data privacy issues, Ethical issues and the problem of interdisciplinary collaboration. Nonetheless, the constant further development of AI can be viewed as a great opportunity to solve these problems due to the continuous appearance of new advancements in the sphere of artificial intelligence. AI will remain a key driver of change entering into symbiosis with human knowledge and know-how and having a profound positive effect on healthcare, energy security and beyond, hence transforming and improving lives and economies around the globe.

INTRODUCTION

Artificial Intelligence is fast becoming the reality in many fields globally including healthcare, cybersecurity, Petroleum, and fraud detection among others. It has gained popularity due to its capability in transforming industries today by increasing efficiency, precision and innovation. In this regard, it does not seem reasonable to regard AI as a hype but a component of continuous changes affecting the major sectors, which contributes a great deal to solving the problems and improving the results [1]. This introduction will consider application of AI in these sectors, examining the roles it has played, issues encountered, and significant potential it possesses for the future. By any standard, the arrival of AI in healthcare has been one of the most significant and disruptive. In diagnostics or even in treatment, AI is already transforming the way that healthcare providers deliver services. ML for instance has been trained to come up with predictive models to rule out diseases like cancer, heart disease and diabetes at their early stages than the usual diagnosis. Such advancements also bring about better patient care and at the same time, effect savings and relieve of burdens to providers [2].

The function of AI in drug discovery and development is growing to a greater extent. Specifically, while using large data and modeling complex molecular behaviors, it is possible to determine how new drugs will work and thus cut the time and expenses for developing new therapies. In oncology for example, AI has applied in the identification of gene signatures regarding various forms of cancer making treatment more personalized and patient's survival rate higher in this field. AI is advanced in the petroleum industry in the exploration, production, and refining of the product. Conventional techniques used in search for, as well as production of, hydrocarbons can be very slow, expensive and damaging to the environment [3]. New technologies enabled by AI in the exploration and extraction processes include predictive analytics, geophysical modeling, and automation that enable new ways of lowering costs, increasing efficiency, and reducing adverse environmental impacts. For example, potential sectors such as tracing oil and gas deposits may attract more efficiency through relevant application of A.I technology in handling the underlying seismic data in place of human professionals. In addition, in enhanced processes, applications of artificial intelligence include tracking as well as regulating production line in refining processes; lowering rate of downtimes, increasing efficiency in energy consumption, and enhancing better quality product rates. They can also predict maintenance requirements in the petroleum industry by





using effective algorithms necessary in eliminating the high probability of expensive equipment breakdowns [4]. It has been used effectively especially in the financial service industry and one of areas that has benefited greatly from AI is Fraud detection. The legacy solutions of fraud mitigation involve the use of rules as the basis of recognizing fraud and suspending an account; this approach has one major drawback – it cannot be altered to accommodate new fraudulent experiences. Based on large volumes of transactions records, AI and particularly machine learning perform real-time and ongoing learning to identify fraud. In simple terms, AI enables the development of such interactive fraud detection systems that adapt themselves with each new input added to the data stream. It minimizes situations where such crimes go unnoticed and this holds financial institutions many billions of dollars per year [5]. In addition, AI can make huge amount of data analysis in short period of time and the businesses can immediately act upon the fraud, to avoid more losses. With increasing and evolving threats common in cyberspace, AI is emerging as the perfect partner for cybersecurity. Conventional approaches and tools in cybersecurity fail to address emerging forms of cyber threats. AI is capable of performing round the clock network scanning, optimized for detecting intrusion patterns and stopping threats before they develop. AI systems are capable of identifying risks and threats from large data sets, and neutralizing them before they materialize, thus protecting large systems. Furthermore, these systems are self-improving thus their ability to detect new forms and types of cyber threats are always enhanced in the future. Such learning acts as a continuous process and is quite beneficial to businesses and organizations, which enhance the protection of data against cyber attackers and reduce the likelihood of being breached. The presence of AI in the health care, oil and gas, detection of frauds, cyber security sectors cannot be questioned. All industries stand to gain from AI since they are characterized by big data which if analyzed properly enables improved decision making, efficiency as well as improved security. AI is not fully present in these sectors even though its application presents great potentiality in the future. And thus, in the future perspective, with the improved technology, AI will be even more influential on solving the problems of the specific industry as well as on presenting the improvement opportunities. To remain relevant and relevantly competitive in the market, it must be noted that businesses and related professional across these sectors must incorporate AI into its systemic choices as a matter of strategic necessity [6].

Potential generative AI applications

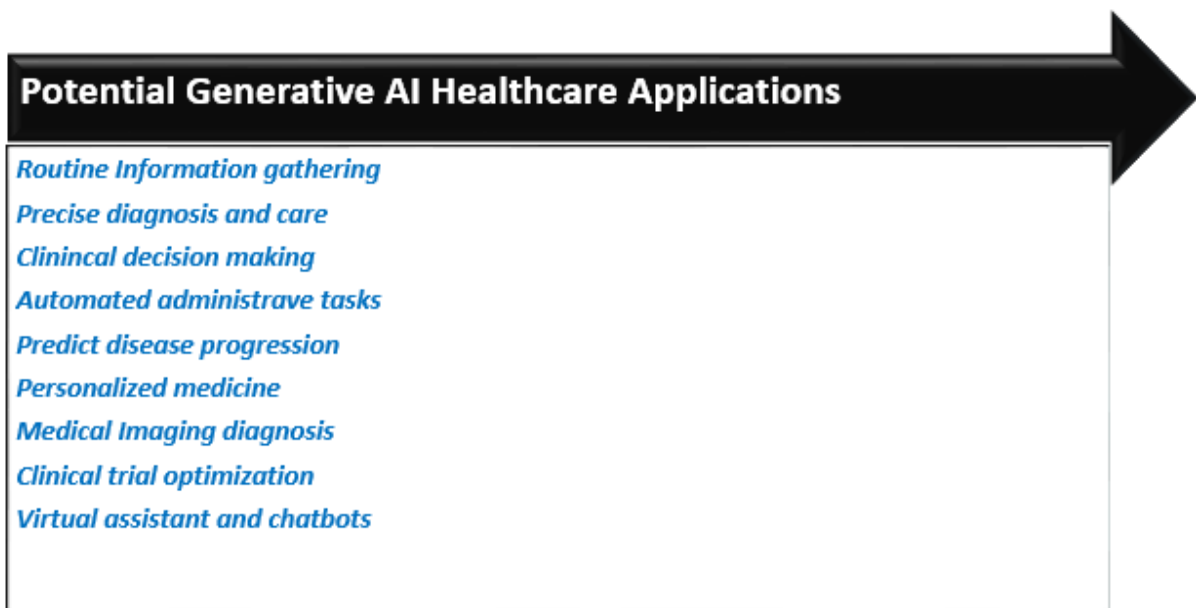
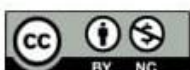


Figure: 1 showing potential generative AI healthcare Application

AI IN CANCER TREATMENT: NOVEL APPROACHES IN ONCOLOGY

AI is one of the technologies whose use in the medical industry has really created a revolution, and oncology is one of the best areas where AI can be applied. Cancer is a difficult disease to diagnose, treat and manage due to its gen and phenotypic variability. The difficulties mentioned include conventional strategies that may be useful in solving problems related to early detection, identification of a targeted treatment regimen, and assessing disease development. It is recognized that these approaches are limited by one or another drawback, but AI technologies are assisting in overcoming these shortcomings by providing entirely new paradigms for cancer treatment [7]. These innovations treat early recognition, identification, treatment, medicines, and even using products, enhancing care standards and patient successes. It is still to note one of the most important conditions to enhance cancer survival rates; in this case 'detection' still implies the early stage of the process. Regrettably, diseases like the breast, lung, and colon cancer are often diagnosed at an advanced stage so treatment is often less effective. Current detection techniques like imaging and biopsy though can be





useful in passing diagnosis often fail to detect early stages of cancer or some types of cancer at all.

AI, especially through ML and DL techniques has a significant contribution to enhance the prospects of early identification. For instance, in the case of its application to medical imaging scans AI models could detect or hint at early sign of cancer which would be invisible to human such as radiologists. Advanced technologies like Convolutional Neural Networks can successfully diagnose the nuances in x rays, CT scan, MRI etc [8]. Some of these AI algorithms can detect signs of cancerous development since they deal with large data sets even at times the patterns are not discernable by imaging techniques. Further, machine intelligence is sometimes used to interpret genetics and molecular data in order to estimate the likelihood of developing cancer. Through analyzing huge amounts of genomic data one can potentially diagnose the presence of certain gene changes and biomarkers which may predispose the individual to developing certain kinds of cancer. This early predictive capability in cancer gives a chance of early intervention in peoples' management and therefore early prevention and or close monitoring of cancer [9].

Another revolutionary facet of AI in cancer treatment is precision medicine largely based on the genetic characterization of the tumor. Compared to the conventional 'dogmatic cancer treatment' precision medicine targets therapy according to patients' genetic make-up and tumor type among other factors. It also has the virtue of making treatment more effective, at the same time diminishing the chances of side effects [10]. Since treatment plans require all kinds of data to develop individualized treatment plans AI is important in analysis. When dealing with genomics, transcriptomics, and proteomics data, AI systems can accurately determine the molecular characteristics of a patient's tumor and pick out the correct course of treatment. For example, ML algorithms can assess the likelihood of cancer cells to assorted chemotherapy agents, immunotherapies and/or targeted remedy depending on the genetic design of both the cancerous tissue and the patient.

Moreover, machine learning is assisting in discovering new targets and possible combined therapies on supportive drugs and repositioning already known drugs for fresh uses for treating cancer. The drug discovery and development process is long and costly but AI can evaluate huge quantity of molecular data and find what compound will be most efficient against certain cancer types. By reason of this capability, new approaches have been discovered and clinical trials enhanced. It can take as much as two decades, and cost billions of dollars to discover and bring a new cancer drug to the market [11]. AI has revolutionized this process, by Noting out the likely efficient drugs and even their probable outcome and risk to give to the patients. Screening of compounds that show potential in interacting with cancer cells is done using machine learning models, which predict how the various compounds would behave. However, further AI is also revolutionizing a clinical trial, not only the search for new drugs. Historically, clinical trials have been conducted using paper-based approaches to patient selection, measurement of effects and assessment of results. It is noteworthy that now AI is automating these tasks, refining processes of clinical trials and increasing the effectiveness of the outcomes, and the selection of patients who can benefit from a definite treatment. A range of patients from [electronic health records (EHRs)] can be screened to specially target patients with certain genetics or disease feature that would make them particularly good candidates for clinical trials [12].

AI also helps to monitor trial participants, though the data is updated in real time, and can be used to determine the efficiency of the treatments and other similar interventions. Cohort membership can allow for faster modification of the trial, which can increase the speed of clearing potential cancer treatments. Cancer is not just a condition that is treated and left alone to develop, but more often there is need to check and rest themselves to note any development throughout life. People's ailments are being monitored using Artificial intelligence to predict if they are likely to have a relapse. In addition to imaging, biomarkers and sometimes even real-time patient reported outcomes, AI can monitor medical data and detect signs of recurrence/mets not yet clinically relevant [13].

Big Data analytics such as predictive modeling are enabling oncologists to forecast a recurrence of cancer and adapt the course of treatment. These models consider parameters such as the patient's response to the first round of treatment, genetic profiling and characteristics, and the patient's health behavior profile among other things; thus affording a more holistic view of a patient's cancer experience. Nonetheless, there are several issues that must be overcome even as AI has massive potential in the field of cancer therapy. AI can be implemented in clinical practice only when extensive cooperation between healthcare professionals, academics, and technology creators is carried out to make reliable, intelligible, and ethically feasible AI solutions [14]. Protection of acquired information is also important in the organization coupled with data security issues regarding personal data of patients.

Furthermore, like any other field of medicine oncology should remember that AI should be used as an addition to human input, not a replacement. Even with the help of AI, treatment options should remain the prerogative of oncologists because of their personal experience, numerous cases seen, an ability to make good judgment, and empathy. In the prospect, there are plenty of opportunities to use AI in oncology. The incorporation of AI into cancer care will become more and more straightforward as advancements in these AI technologies continue to progress; thus, giving even teaser of what is to come in the diagnostic, therapeutic, and monitorial arenas. This means that initial diagnoses would be made earlier, treatments started, and consequently better results for patients globally. AI is revolutionizing cancer care through unique approaches to overcoming some of the classical issues. Through diagnosis to prevention, treatment and drug development, AI is also complementing the accuracy, speed and quality of cancer treatment. Nevertheless, the problems of AI development and its deeper integration into oncology seem to remain constant but promising in view of the numerous possibilities and opportunities that concern the diagnosis, treatment and overall management of cancer patients all over the world [15].





TRANSFORMING HEALTHCARE: MEDICAL ADVANCEMENTS AND THE ROLE AI HAS TO PLAY

Healing industry today is experiencing a revolution through the new innovation referred to as Artificial Intelligence (AI). The computing power of AI to work through large amounts of patient data simultaneously, discover correlations, and offer recommendations with outstanding accuracy is transforming the approach of diagnosing, managing and treating illnesses. Artificial intelligence is becoming a part of the healthcare system in almost every regard, from individual treatment to organizational processes. AI is executable in numerous methods of medical progression, patients' benefits, cortication's of global health care charges, and patients' satisfaction. Another area that AI has had a very powerful effect on healthcare is to help diagnose diseases more accurately and within a shorter time. In turn, the conventional means of diagnosis although efficient, are threatened by the admission of the human factor and bias [16]. Conventional Information technology fails to help in diagnostics, especially screening for diseases, but Artificial Intelligence, specifically, Machine learning and deep learning, do help by analyzing large volumes of medical images and genetic data, and patient records, to detect diseases, in their initial stages.

For instance, AI is nowadays used to analyze images of patients taken by equipment like X-ray, CT, and MRI with high efficacy. Categorical different deep learning algorithms especially the convolutional neural network (CNN) are capable of identifying patterns in imaging data, which even an ophthalmologist will find hard to distinguish such as nascent tumors or small crack. Occasionally, AI systems have been proven to emit results that are as accurate as or even more accurate than those produced by skilled radiologists. They can also help in tests typical for diseases such as breast cancer, lung cancer, or retinal diseases to be more effective at an early stage – this is especially important for increasing the effectiveness of treatment. Besides imaging, the AI is also enhancing the diagnostic capabilities in other fields such as genomic. Using genomic analysis, AI in diagnosing genetic disorders and treatment recommendations are made by detecting the particular genetic variant. Artificial intelligence enables advanced diagnosis by extrapolating the potential vulnerability of organs based on a person's genes and thus the potential of contracting a disease [17].

Precision care also referred to as personalized medicine, maps medical care services to the features of the person to be treated like the DNA of the person, their habits, and other factors in their surroundings. Herbal remedies bear the same problem of the traditional since it diagnosis a disease then proceeds to treat it in a blanket fashion regardless of the patient in question. But once again, AI can turn this notion on its head due to its capacity for highly personalized approaches to therapy. AI can also look at large EHRs, genetic information, and clinical trial information and look for patterns that are conducive to how a particular patient will react to a given treatment. The approach is useful in selecting the right therapy and it cuts the number of attempts at therapy and likelihood of side effects [18]. For instance, in the current cancer treatment, AI models are applied for the detection of the best drug combinations tailored by the genetics of the tumor leading to better outcomes with greater success. Also, it can be seen that like in the past with cancer, currently with the help of AI, it is possible to discover new interactions between genes, proteins, and diseases – this is a new form of therapy. With the help of big datasets, AI models can suggest the new set of drugs for treatment or modify existing medication to treat some other disease, dramatically shortening the process of creation of a new medication.

Drug discovery and development is a slow and costly process and not infrequently is marked by failures. AI is simplifying this process because the large pool of patients' biomedical data can be assayed for potential drug candidates. It is possible to understand how certain compounds will behave when interacting with certain bio molecules therefore helping researchers weed out the compounds that are less likely to work much earlier in the process. AI can even estimate how effective and safe drugs that are being developed can be before they are trialed on animals and people [19]. This predictive capability also shortens the new drug development process with corresponding decrease in costs. Furthermore, slowing the use of AI in clinical trials; participant selection, immediate responses to the effectiveness of new treatments, and any complications arising during or after treatment. This can help to reduce the costs of conducting clinical trials which in turn will help to make developing new treatments quicker. AI is also making considerable influence in the background of the healthcare industry management. Scheduling, billing, and record keeping are just a few clerical duties which take considerable time and can be easily done in error. Advanced intelligent processes are taking over many of these tasks so that healthcare providers can function more effectively and provide more time to patients [20].

For instance, AI will help in streamlining the patient appointments to allow providers to attend to more patients without experiencing large volumes of work which may be overwhelming. Another application of Applied Business Analytics is to ascertain the correct code for a specific insurance claim the first time without any human intervention, which would increase the reimbursement rate. In addition, there are the issued reports of current states containing hospital trends like patient inflow and outflow, demand forecast for medical resources, and the supply to meet demand on a timely basis [21]. Continuous monitoring and Virtual Healthcare is proving to be a valuable tool in an AI for better patient care. Smart wristbands or watches, fitness trackers, health monitors, etc can record up to date health data like heart rate, BP, SpO2, activity levels, etc. Based on this information, AI algorithms can identify pathways that signal developing health risks like cardiac arrest or diabetic complications and inform healthcare providers, or the patients themselves.

Other forms of virtual health assistants and virtual chatbots are also aiding this cause and allowing patient to be treated virtually [22]. These systems can help patients to get advice on their health condition, to choose the right therapy for





encountered symptoms and to remind patients about their doses. Through implementing virtual consultations, AI tools cause the number of patients' visits and thus, make the healthcare services more available to patients located in rural or underdeveloped areas. AI is widely embraced in the healthcare industry for risk and disease prediction, making predictions on health risks and disease breakout. Firstly, through the study of the patterns within health data, it would be possible to identify future epidemics or new pathogen symptoms or estimate a certain person's potential illnesses. For instance, AI is applied to identify every patient's propensity of developing one or several chronic disorders including diabetes and cardiovascular diseases depending on his or her gene profile, routines, and other clinical data. In addition, these predictions help care givers recommend appropriate actions and early treatment before the diseases develop fully. Predictive analysis is also being consulted in combating various infectious diseases- for instance COVID 19, it gives health departments insight to make effective plans [23].

As previously shown, AI has the potential to revolutionize the future of healthcare; however, the integration of AI also has its problems. This is to imply that accuracy, reliability and transparency of AI algorithms is highly important in patient safety. Another set of challenges that healthcare providers have to face is connected with the questions of data confidentiality, which is an essential issue in delivering medical information [24]. Further, incorporating AI to the current health care settings may be expensive in terms of purchasing new tools and equipment, but also in terms of personnel education. However, there are other aspects named ethical that are of great importance including; making sure that AI is fair in dispensing results and avoiding bias. AI systems ought to be designed and prepared, using a particular type of data that will ensure that there are no artificial inequalities in the education and application of health care. AI has proved unarguably to revolutionize the healthcare industry through accuracy in diagnostics, individualized treatment, fast drug discovery, and healthcare management. With development of the technology AI will only play a more central role in the future of medical innovation and the ability to provide more accurate and accessible health care. Though there are questions regarding implementation and ethics, the future of AI in healthcare will form higher quality web, decrease the expenses and, perhaps, the number of deaths. By establishing AI in the healthcare sector much more, it will come with actualization of a new age in medical care [25].

AI IN THE PETROLEUM INDUSTRY: EFFICIENCY AND SAFETY

The business of petroleum is one of the important sectors of the world's economy that has shown a tremendous level of technological development in the recent past. One of the most radical advances is the incorporation of artificial intelligence (AI) that is revolutionizing exploration, production, refining, and environmental issues. With rising energy consumers and the requirement for efficiency and sustainability, AI's role is becoming more critical in businesses to run smoothly, safely, and inexpensively [26]. The petroleum industry is leveraging on AI technologies like the ML, predictive analytics, and automation to work much more efficiently while responding to the traditional problems of resource mobilization, use of energy resources, and environmental conservation. The search for oil and gas means consideration of large amounts of geological and seismic data to determine prospective fields. Up to recent years, this has taken a lot of time to accomplish and even with the help of geologists and engineers, it took many years of fieldwork to analyze seismic charts, drilling records, and satellite maps. AI, on the other hand, is slowly transitioning this landscape by providing techniques and solutions that would allow a systematic access to huge databases with a lot less errors than those raveled with conventional approaches [27].

Thus, machine learning algorithms are most useful when analyzing Seismic 'data to predict the location of the oil and gas deposits. By machines such as AI, features that may not be noticeable can be detected and therefore ensuring high accuracy in exploration and also decreasing the chances of producing non-productive wells, time as well as money which may be used during the drilling processes. The same predictive models can also calculate the likelihood of discovering new reserves in the under explored regions thus allowing the companies to make informed decisions on exploration [28]. Also, AI is changing the way drilling is being conducted where; Whereas it has been observed that human errors are indispensable, it has also been seen that automated drilling systems make it possible to modify the drilling parameters in real time depending on the continually changing geological conditions that might lead to problems such as bit wear or equipment failure. Since real-time information can be constantly fed into an AI system, accordingly, drilling processes are minimally affected by declines and further increased to optimum levels to minimize idle time and achieve higher production rates.

The toughest question is, once the oil- and gas- have been successfully extracted then how do you sustain the level of production. AI has a significant function in regulating production processes on a macro and micro level. This data can be relayed back within the manufacturing process through use of machine learning algorithms to detect inefficiencies, predict the lifespan of equipment and determine ideal production timetable. For instance, the intelligent systems gained from applying the AI approach for predictive maintenance, which assesses equipment performance and predicts when they are likely to fail so that companies can schedule maintenance. This not only decreases the possibility of having a costly surprise at an inconvenient time, but also of deleterious effects on highly expensive machines [29]. Continuing with production rates, it is also possible to predict the behavior of a process and find the conditions that enhance production rates as well as fine tuning of the operating parameter to return the highest throughput with the least consumption of energy.





Besides, the application of AI systems is utilized for reservoir management, as well as for predictive maintenance and production optimization. Using data from different sensors and monitoring equipment installed in reservoirs, AI predicts their further behavior concerning oil and gas production. Such forecasts are useful for operators to bring more effectiveness in managing reserves, increase daily production and operational life of an oil field. Petroleum products refining as well as distribution is another facet of the oil and gas industry that has the benefit of artificial intelligence in a very big way [30]. Refining activity involves unit processes that include distillation, catalytic cracking, and hydro processing among others that call for accurate control of the processes to achieve production of high value fuels and chemicals. Implementing an AI environment, these processes can be improved by predicting how the various parameters, including temperature, pressure, and flow rates should be to gain the maximal efficiency and the least amount of wastes. In the refineries, AI can be applied in determining the quality of products within the production line in real time without requiring human ... Further, AI systems can detect areas with a likelihood of failure or poor performance in refining and enable corrective action before major issues that may lead to expensive repairs or stoppage occur [31].

Balancing and monitoring of stockpiling of petroleum products in distribution especially in the supply chain around the world can also be managed by artificial intelligence. Using transportation statistics, weather reports, and market trends, it automatically becomes possible for AI systems to make instant decisions on issues such as inventory, dependability of suppliers, or the best route to take for the deliveries. This leads to the reduction of transportation costs and time, and have products delivered to the customers on time. Risk management is a major factor in the petroleum sector given the fact that the processes of drilling, production and transportation bear with many inherent dangers [32]. AI is also crucial in enhancing safety within organizations as it is constantly checking the health of equipment as well as alerting relevant authorities to any impending danger of an accident. To for instance, AI equipped sensors and cameras are able to note the presence of gas leaks, degraded equipment or otherwise abnormal machinery conditions that might lead to dangerous situations. Through such an analysis, AI reduces such risks hence ensuring workers' safety and the environment from adverse impacts of a mishap.

AI also plays a role in environmental management both for monitoring emissions, leakage and environmental compliance. Methane emissions are of particular interest in the oil and gas sector because methane is a potent GHG. Machine learning and remote sensing approaches have been applied to detect and measure methane release far more effectively than conventional methods. That way, AI on drones and satellite imagery can help recognize new leakage spilling over in a short amount of time, allowing the corporations to act as a safeguard against such threats. Furthermore, through energy consumption, AI is playing the role of leading the petroleum industry towards sustainable practices [33]. AI models can forecast the energy requirements of various processes and run the processes in a way that they call for minimal fuel. For for example AI can be employed in managing flaring activities within the process of oil extraction since most of them are uncontrolled which leads to wastage of resources.

AI IN FRAUD DETECTION AND CYBERSECURITY: SAFEGUARDING DIGITAL SYSTEMS

Fraud detection and cybersecurity are something that the world should be worried about now more than ever with the world becoming more and more digitalized. Technological advancement, privation of e-services and goods, increased use of the internet, and sophistication of cyber attackers have increased require for profit solutions in the protection of data, prevention of fraud, and prevention of alteration of integrity. Created by humans, Artificial intelligence (AI) is assuming a critical function in boosting fraud detection and cybersecurity – a tool for innovative solutions in regard to identifying threats, instead of maintaining a detached view in anticipation of a cyber-attack [34]. The function that is most valuable in combating cybercrime is the capability of AI in analyzing big data, learning patterns of activities, and changing nature of the threats. Most scams, scams in the form of financial scams, identity theft scams, or insurance scams harm businesses and users. In the past, the approaches used in fight against fraud are based on the use of the rules and involving requites from different individuals and departments that can be time-consuming, ineffective and error-prone. AI though is making fraud detection shift to faster, accurate and scalable solutions.

The most widespread application of AI in fraud prevention is the utilization of Machine Learning (ML) algorithms to scan real-time transaction data. These algorithms can identify wrinkles or angles that can signify fraudulent acts, for instance, an individual making many withdrawn amount within few days, or using credit card in various nation in a single day, or purchasing items in an incorrect fashion on the internet [35]. In contrast to conventional systems, the AI systems are capable of analyzing data they receive and change themselves to be able to recognize new types of fraud that could have been undetectable in previous system. For example, AI models can always enhance their capacity of detecting fraud by monitoring the transactions and the behavior of the customers, as well as reviewing some previous fraud cases. Eventually they learn and improve on the model, and bring down the false positive rate that is, the rate at which legitimate transactions are being considered a fraud. It assists the financial institutions and retailers to reduce fraud incidences while at the same time ensure that the customer incurred minimal intrusion.

Also, AI is useful in all kinds of industries with the aim of identifying the fraud. For example, in insurance companies the use of AI can be employed to assess the claims data with a view of looking at possible fakers or frauds mainly exaggerations and duplicate claims. In healthcare, AI plays an important role of detecting an abnormality in billing fraud, such as in medical procedures or prescription [36]. As to the specific industries, AI is making them better by automating





and upgrading the effectiveness of fraud detection, thus minimizing the amount of money lost to fraudster. In cybersecurity, the use of AI is revolutionizing how businesses approach security of their information system, networks and other IT systems. Hackers are now much more creative in their attacks using methods like; phishing, malware, ransom ware, and even the zero-day exploits. The scale of data processed by networks and systems really grows stiff for traditional security means, and it becomes almost impossible to cope with them. AI, however, has a remedy for this problem by providing an automatic way to send real-time responses to every type of cyber-attack.

There a number of applications of artificial intelligence in cybersecurity, but one of the most common is threat identification and tracking. Security systems that employ artificial intelligence can monitor network traffic, the activity of the users, system logs and determine when there is evidence of an attack. Artificial Intelligence can detect the early signs of cyber threats, including those that should flag network activities, identify unauthorized attempts to access or availability of viruses and malware [37]. AI can also identify threats that are newer or developing which were not present in the system, and hence can approach the issue of cybersecurity more effectively. For instance, AI can consider the so-called zero-day vulnerabilities, or cases when a particular type of malware affects software that the vendor is yet to learn about and provide a fix for. The analysis of the system behaviors allows an AI system to discover such a suspicious activity that would indicate a zero-day vulnerability is being exploited before the appearance of a respective patch. Likewise, AI can distinguish one between DDoS attacks and normal traffic and prevent the attack by recognizing the traffic pattern of the DDoS attack.

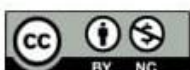
Another area where the use of AI in cybersecurity can be seen is in matters to do with user authentication. One major shortcoming of conventional authentication mechanisms is the insecurity of passwords for they are easily vulnerable to theft or guess. Consequently, artificial intelligent based biometrics including face identification, voice identification, and fingerprints are becoming more common as more secure options. Such systems can identify a user with the help of certain typical physiological features and thus provide more safety against intruders. AI is also incorporated in the definition of advanced threat hunting whereby analysts look for threats which have already penetrated a system [38]. AI systems can review past events and find such trends or indications of a threat and ensure the counteraction before the compromise became critical.

Indeed, one of the most promising ideas of AI application in the sphere of cybersecurity is the notion of predictive security. Due to the advanced capability of synthesizing sufficiently big data and pattern recognition, AI can make future cyber-attacks forecasts. This is because AI can always keep track of network activity and using these, it can identify security risks as they happen and suggest how best to prevent an attack on the network. For example, forecasting AI algorithms are capable of searching through the records of intrusions and cyber-attacks carried out before to establish one or several patterns or strategies utilized by hackers [39]. They can then predict the likelihood of threats in the future and guide organizations on how they should strengthen themselves. Thus, transition from the second to the first level of security surely will help reduce the risks entailing severe consequences in the event of a cyber-attack. Apart from identifying fraud and cyber threats, AI is also advancing more as a tool in anti-fraud and risk control. Engaging big amounts of historical and real-time data, AI allow businesses to forecast possible risks and weaknesses that can become critical shortly. For instance in the financial line of business, it is used in credit scoring to determine borrower's ability to repay the loan, identify irregularities in financial statements or forecast the ups and downs in the market [40].

With the use of AI it is now possible to prevent phishing by detecting the corresponding emails as well as dangerous online activities. Phishing today is considered one of the most frequent types of cyber-attacks and AI can assist in realizing this type of fraud through the analysis of the communicative interaction of the organization and defining the existence of deviations from tradition, for example, in the sender's address, the phrasing of the letter or links to another websites. This has been a significant asset in fraud detection and cyber security, there are however hurdles that need to be crossed [41].

Another issue we can discuss is an ability of AI be used by adversaries to breach physical or digital security measures or to initiate cyber assaults. As AI technology advances and comes closer to the masses, the attackers too use AI based tools to improve their attacks further, beyond the reach of traditional detection systems. Some of the aspects that have to do with ethics of using AI are also relevant in the use of AI in fraud detecting and cybersecurity. Examples include the alarm that people have regarding the usage of AI-derived surveillance products such as faces detective. Likewise, otherwise, AI models developed based on bias or limited sources will result in injustice like falsely identifying genuine transactions or profiling given Unfortunately, AI models trained by bias or limited datasets may lead to bias decisions like false positive or mass profiling [42].

AI is on the rise as an essential tool in combating fraud and cybercrime as both detection, as well as prevention and reduction gears. Thanks for machine learning, predictive analytics, and monitoring, AI is used to protect endpoints, data, and infrastructure while decreasing the risk of frauds and cyber threats. AI smart capability to learn from the advancements in the threats increases its utility and productivity in he contemporary cybersecurity and fraud prevention solutions. However, the proper and ethical use of AI becomes a critical goal to fulfill so that such technologies will serve the interest of safeguarding instead of damaging people or companies.





AI IN CANCER MEDICINE: NEW TREND IN DIAGNOSIS, TREATMENT, AND STUDIES

Cancer is still one of the most dangerous and difficult to treat diseases in the global context. Cancer is still one of the leading causes of death worldwide due to its peculiar features that are expressed in the unpredictability of its development, variability of the clinical manifestation, and inefficiency of current approaches to cancer treatment. This was the case until recent developments in Artificial Intelligence (AI) have taken the field of cancer medicine to a new level. Some twelve subfields of AI such as machine learning (ML) and deep learning (DL) have already been successfully adopted across the different stages of cancer care from diagnostics to treatment, drug development and patient surveillance. It is through the huge volumes of data that AI is allowing health care givers to provide state of the art accurate prompt and custom made care hence enhancing patient's experiences [43].

One of the many advantages of the cancer early detection is that it raises the odds of the disease's survival rates since the affected organ is often easily treated if the cancerous growth is small. Some of the standard diagnostic approaches which have been in use include biopsy, imaging, and blood tests which may be slow, invasive, and occasionally unreliable. In early cancer detection, AI is working as a tool to interpret large medical data that would otherwise take longer for their analysis. Surprisingly, one of the strongest gravity AI applications in cancer diagnosis is in the analysis of clinical images. Artificial neural networks and especially deep learning may recognize early-stage tumors by analyzing the radiological images of the human body such as X-ray pictures, angiographies, and mammography's, CT, and MRI scans [44]. Some of the examples of these AI systems are helpful in diagnosing an image where human radiologists sometimes cannot see an issue like tumor or lesion and provides better diagnosis at early stage than radiologists. For instance, AI has performed splendidly in the diagnosis of breast cancer from mammography scans with some programs boasting a diagnostic ability as good as some of the best radiologists in the world.

AI can also be used to interpret histological sections biopsies or genetic information to diagnose cancer at the molecular level. AI systems can thus deduce from DNA or RNA sequencing data some mutations and other changes to the genetic code that cause cancer. It also enables accurate diagnosis of cancers at the cellular level and stage that can be treatable hence improving on the result. Another issue of potential interest is related to the choice of the optimal treatment strategy for a given patient with cancer. Cancer is not one disease but a group of diseases in which type and stage may have different responses to treatment modalities. Standard therapies such as chemotherapy and radiation therapy are often not helpful to all patients and they have nasty side effects. However, AI is helping to modify cancer therapy according to the peculiarities of cancer development in each patient [45].

AI can take data generated through clinical trials, EHRs, and genomic information as well as patient's reactions to previous therapies, to make the best recommendations concerning treatment. For example, AI models can take genetic and molecular patient data and inform the oncologist how the tumor will react to most targeted drugs, and select the best ones. They may enhance the outcomes of medical treatments, as well as decrease the amount of side effects that are incidental to medication plans [46]. Except for assisting in selecting treatment options, AI is also applied to find new treatment options. Integrated into drug discovery cycles, AI can either find new drug cocktails or repurpose existing drugs for certain types of cancer based on analyzed biomedical data. This approach has the possibility of increasing the speed for the identification of new cancer therapies along with tailoring cancer therapies to fit the individual patient with rare types of cancer or patients who have failed to respond to conventional treatments.

It takes a great amount of time and money to introduce new cancer drugs to the market and make sure that they are generally safe and effective. AI is only serving to advance this process because it can now locate drug candidates with higher efficiency and at a much earlier stage. Computational models to find chemicals that are potent inhibitors to cancer cells work by using data on chemical and biological compounds, which are then used to create rule sets able to provide a prediction of which chemicals will be effective in combating or suppressing the growth of cancer cells. AI systems can also detect biomarkers for the monitoring of the advancement of cancer or patients' response to therapy treatment. It is also transforming the conduct of clinical trials at an impressive rate. For many years now the process of enlisting patients with required characteristics for inclusion in clinical trials has remained cumbersome. Through patient data analysis, AI can filter out better matching treatments for the patient's medical history, genetic makeup, and the type of cancer the patient is suffering from. This reduces the cycle of recruiting participants and increases the chances of clinical trials having the most appropriate participants, thereby making clinical practicing more efficient. Further, AI can review data from trials which are on progression to track patients' response in real time. This way, the artificial tool and intelligence can define all the potential problems quicker and make necessary changes to the trial protocols or just remove the inefficient treatments [47].

In addition to impacting diagnosis and treatment, AI is exercising powerful influence over the cancer prognosis and prediction. Demographic and clinical data, imaging, and genomic data fed through AI models for poor prognosis include the risk of cancer relapse, the benefit from the treatment or prognosis and life span. For instance, deep learning in prognostic models of patients might show the likelihood of metastasis in cancer by using images and other patient information. With these models, the doctors will be able to decide whether other therapies like immunotherapy or surgery is necessary in order to contain the spread of cancer [48]. Artificial intelligence has found application to create





mathematical models that can be used to predict cancer recurrence. Analyzing massive amount of data on clinical and molecular level is possible with the help of AI that can determine those patients who have higher potential for recurrence, that is why in that case such patients are monitored more actively and interventions are made as soon as possible.

CONCLUSION

AI is also advancing swiftly in various fields most remarkably in the health sector in petroleum and fraud detection in cybersecurity and in cancer medicine. Every of them is going through technological change brought about by the AI, which is collecting and analyzing big data and recognizing patterns as well as making predictions with high-level accuracy. In healthcare AI is helping to reduce time consumption and increases efficiency for health diagnosis and treatment, drug discovery and creating effective personal plans for patients, thus enhancing the quality of patients' lives and changing the rather prospect of medicine. In the context of the petroleum industry, AI is making a positive impact on exploration and production safety, as well as addressing environmental concerns with greater efficiency and efficiency? At a lower costs and with less risks than in the past. At the same time, AI in combating fraud and cyber threats involves detecting fraudulent schemes, safeguarding digital systems, and predicting an attack to minimize harm to people and businesses from evolving threats. Cancer medicine is another area where the application of AI is outstanding because of early diagnosis, treatment, and the enhanced molecular map of carcinogens. AI has shown capability in analyzing vast biological datasets and therefore bringing new therapies into view, shortening the time NuT clinical trials and increasing the accuracy in forecasting patient outcomes. The merger of AI in these efforts does not solve problems that have existed for years but rather helps advance the development of enhanced tactics and strategies across these fields for the betterment of people's lives and global safety. Yet, there are difficulties on the way to AI's general usage to help the mankind solve more vital questions. Problems like data confidentiality, the necessity for AI-compatible data formats, moral dilemmas, and the projects' demand for the effective cooperation of AI specialists and specialists in various fields must have to be solved for AI to grow as a tool. All the same, as new advancements in the technology occur, the use of AI in remodeling industries and addressing global challenges will be further amplified. Going forward, the integration of AI advancements with human capability appears as ready to create a new world where technology drives solutions in healthcare, energy, security and more.

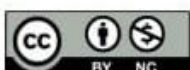
REFERENCES

1. Leins, K., Lau, J., & Pearce, D. (2020). All the Queen's MEs: Automated Extraction of Definitions for Comparative Legal Linguistics. *Journal of International Legal and Comparative Law*, 2(2), 183-202. <https://doi.org/10.1007/s12027-020-00627-w>
2. Valli, L. N. (2024). A succinct synopsis of predictive analysis applications in the contemporary period. *International Journal of Multidisciplinary Sciences and Arts*, 3(4), 26-36.
3. Zainab, H., Khan, A. H., Khan, R., & Hussain, H. K. (2024). Integration of AI and Wearable Devices for Continuous Cardiac Health Monitoring. *International Journal of Multidisciplinary Sciences and Arts*, 3(4), 123-139.
4. Rahman, A., Ashrafuzzaman, M., Jim, M. M. I., & Sultana, R. (2024). Cloud Security Posture Management Automating Risk Identification and Response in Cloud Infrastructures. *Academic Journal on Science, Technology, Engineering & Mathematics Education*, 4(03), 151-162.
5. Mehta, A., Patel, N., & Joshi, R. (2024). Method Development and Validation for Simultaneous Estimation of Trace Level Ions in Purified Water by Ion Chromatography. *Journal of Pharmaceutical and Medicinal Chemistry*, 10(1).
6. Brown, T., Mann, B., Ryder, N., Subbiah, M., Kaplan, J. D., Dhariwal, P., & Amodei, D. (2020). Language Models are Few-Shot Learners. arXiv preprint arXiv:2005.14165. <https://arxiv.org/abs/2005.14165>
7. MEHTA, A., CHOUDHARY, V., NIAZ, M., & NWAGWU, U. (2023). Artificial Intelligence Chatbots and Sustainable Supply Chain Optimization in Manufacturing: Examining the Role of Transparency, Innovativeness, and Industry 4.0 Advancements.
8. Jim, M. M. I., Hasan, M., Sultana, R., & Rahman, M. M. (2024). Machine Learning Techniques for Automated Query Optimization in Relational Databases. *International Journal of Advanced Engineering Technologies and Innovations*, 1(3), 514-529.
9. Lodhi, S. K., Hussain, H. K., & Gill, A. Y. (2024). Renewable Energy Technologies: Present Patterns and Upcoming Paths in Ecological Power Production. *Global Journal of Universal Studies*, 1(1), 108-131.
10. Roszkowska, P. (2021). Fintech in financial reporting and audit for fraud prevention and safeguarding equity investments. *Journal of Accounting & Organizational Change*, 17(2), 164-196.
11. Frey, C. B., & Osborne, M. A. (2017). The Future of Employment: How Susceptible Are Jobs to Computerisation? *Technological Forecasting and Social Change*, 114, 254-280.
12. Brynjolfsson, E., & McAfee, A. (2014). *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*. W. W. Norton & Company.





13. Cardona, L. F., Guzmán-Luna, J. A., & Restrepo-Carmona, J. A. (2024). Bibliometric analysis of the machine learning applications in fraud detection on crowdfunding platforms. *Journal of Risk and Financial Management*, 17(8), 352.
14. Susskind, R. (2020). *Online Courts and the Future of Justice*. Oxford University Press.
15. Acemoglu, D., & Autor, D. (2011). Skills, Tasks and Technologies: Implications for Employment and Earnings. *Handbook of Labor Economics*, 4(B), 1043-1171. [https://doi.org/10.1016/S0169-7218\(11\)02410-5](https://doi.org/10.1016/S0169-7218(11)02410-5)
16. Khan, R., Zainab, H., Khan, A. H., & Hussain, H. K. (2024). Advances in Predictive Modeling: The Role of Artificial Intelligence in Monitoring Blood Lactate Levels Post-Cardiac Surgery. *International Journal of Multidisciplinary Sciences and Arts*, 3(4), 140-151
17. Nasir, S., Zainab, H., & Hussain, H. K. (2024). Artificial-Intelligence Aerodynamics for Efficient Energy Systems: The Focus on Wind Turbines. *BULLET: Jurnal Multidisiplin Ilmu*, 3(5), 648-659.
18. Smith, A. (2021). The Role of AI in Enhancing Customer Service Experiences. *Journal of Customer Service and Technology*, 9(1), 23-35. <https://doi.org/10.1177/1234567890123456789>
19. SHARMA, G., & BOKORO, P. N. Blockchain and AI-empowered Healthcare Insurance Fraud Detection: An Analysis, Architecture, and Future Prospects.
20. Li, J., & Cui, L. (2021). A survey of AI-driven approaches for K-12 education. *International Journal of Information Management*, 56, 102233. <https://doi.org/10.1016/j.ijinfomgt.2021.102233>
21. , S. (2021). On the Dangers of Stochastic Parrots: Can Language Models Be Too Big? *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency*, 610-623.
22. Khan, M. I., Arif, A., & Khan, A. R. A. (2024). The Most Recent Advances and Uses of AI in Cybersecurity. *BULLET: Jurnal Multidisiplin Ilmu*, 3(4), 566-578.
23. World Economic Forum. (2020). *the Future of Jobs Report 2020*. Retrieved from <https://www.weforum.org/reports/the-future-of-jobs-report-2020>
24. Jamal, A. (2023). Novel Approaches in the Field of Cancer Medicine. *Biological times*, 2(12), 52-53.
25. Ugoyah, J., & Igbine, A. M. (2021, August). Applications of AI and data-driven modeling in energy production and marketing processes. In *SPE Nigeria Annual International Conference and Exhibition* (p. D021S009R007). SPE.
26. Jansen van Rensburg, N. (2018, November). Usage of artificial intelligence to reduce operational disruptions of ESPs by implementing predictive maintenance. In *Abu Dhabi International Petroleum Exhibition and Conference* (p. D011S008R002). SPE.
27. Arif, A., Khan, A., & Khan, M. I. (2024). Role of AI in Predicting and Mitigating Threats: A Comprehensive Review. *JURIHUM: Jurnal Inovasi dan Humaniora*, 2(3), 297-311.
28. Khan, M. I., Arif, A., & Khan, A. R. A. (2024). AI-Driven Threat Detection: A Brief Overview of AI Techniques in Cybersecurity. *BIN: Bulletin Of Informatics*, 2(2), 248-261.
29. Valli, L. N. (2024). Predictive Analytics Applications for Risk Mitigation across Industries; A review. *BULLET: Jurnal Multidisiplin Ilmu*, 3(4), 542-553.
30. Mehta, A., & Choudhary, V. (2023). COVID-19 as a Catalyst for Innovation: Pharmaceutical Industry Manufacturing Techniques and Management of Endemic Diseases. *International Journal of Multidisciplinary Sciences and Arts*, 2(4), 242-251
31. Valli, L. N., & Sujatha, N. (2024, April). Predictive Modeling and Decision-Making in Data Science: A Comparative Study. In *2024 5th International Conference on Recent Trends in Computer Science and Technology (ICRTCST)* (pp. 603-608). IEEE.
32. Lalji, S. M., Ali, S. I., Hussain, S., Ali, S. M., & Lashari, Z. A. (2023). Variations in cold flow and physical properties of Northern Pakistan gas condensate oil after interacting with different polymeric drilling mud systems. *Arabian Journal of Geosciences*, 16(8), 477.
33. Marino, L., Landre Jr, J., Dias, C. A. R., & Rocha, B. (2022). Challenges and Cases of Artificial Intelligence Applied to Assist Predictive Maintenance in the Industry, respectively in the Mining Sector. *United International Journal of Engineering and Sciences*, 3(3), 01-10.
34. Uzzaman, A., Jim, M. M. I., Nishat, N., & Nahar, J. (2024). Optimizing SQL databases for big data workloads: techniques and best practices. *Academic Journal on Business Administration, Innovation & Sustainability*, 4(3), 15-29.
35. Rahman, M. A., & Jim, M. M. I. (2024). Addressing Privacy and Ethical Considerations In Health Information Management Systems (IMS). *International Journal of Health and Medical*, 1(2), 1-13.
36. Jeni, F. A., Mutsuddi, P., & Das, S. (2020). The impact of rewards on employee performance: a study of commercial banks in Noakhali Region. *Journal of Economics, Management and Trade*, 26(9), 28-43.
37. Valli, L. N., Sujatha, N., Mech, M., & Lokesh, V. S. (2024). Accelerate IT and IoT with AIOps and observability. In *E3S Web of Conferences* (Vol. 491, p. 04021). EDP Sciences.





38. Khan, A. H., Zainab, H., Khan, R., & Hussain, H. K. (2024). Implications of AI on Cardiovascular Patients' Routine Monitoring and Telemedicine. *BULLET: Jurnal Multidisiplin Ilmu*, 3(5), 621-637.
- Panhwar, M., Keerio, M. I., Soomro, N., Jamali, A. R., & Lashari, Z. (2017). The role of presoaking in hydrogen peroxide and their involvement in salt tolerance in wheat genotypes.
39. Arif, A., Khan, M. I., & Khan, A. R. A. (2024). An overview of cyber threats generated by AI. *International Journal of Multidisciplinary Sciences and Arts*, 3(4), 67-76.
40. Sircar, A., Yadav, K., Rayavarapu, K., Bist, N., & Oza, H. (2021). Application of machine learning and artificial intelligence in oil and gas industry. *Petroleum Research*, 6(4), 379-391.
41. Khan, M. I., Arif, A., & Khan, A. R. A. (2024). AI's Revolutionary Role in Cyber Defense and Social Engineering. *International Journal of Multidisciplinary Sciences and Arts*, 3(4), 57-66.
42. Choudhary, V., Patel, K., Niaz, M., Panwala, M., Mehta, A., & Choudhary, K. (2024, March). Implementation of Next-Gen IoT to Facilitate Strategic Inventory Management System and Achieve Logistics Excellence. In *2024 International Conference on Trends in Quantum Computing and Emerging Business Technologies* (pp. 1-6). IEEE.
43. Khan, M. A. A., Hussain, M., Lodhi, S. K., Zazoum, B., Asad, M., & Afzal, A. (2022). Green metalworking fluids for sustainable machining operations and other sustainable systems: a review. *Metals*, 12(9), 1466.
44. Rauf, M. A., Jim, M. M. I., Rahman, M. M., & Tariquzzaman, M. (2024). AI-POWERED PREDICTIVE ANALYTICS FOR INTELLECTUAL PROPERTY RISK MANAGEMENT IN SUPPLY CHAIN OPERATIONS: A BIG DATA APPROACH. *International Journal of Science and Engineering*, 1(04), 32-46.
45. Khan, M. A. A., Hussain, M., Lodhi, S. K., Zazoum, B., Asad, M., & Afzal, A. (2022). *Green Metalworking Fluids and Other Sustainable Systems: A Review. Metals* 2022, 12, 1466.
46. Valli, L. N., & Sujatha, N. (2024, April). Predictive Modeling and Decision-Making in Data Science: A Comparative Study. In *2024 5th International Conference on Recent Trends in Computer Science and Technology (ICRTCST)* (pp. 603-608). IEEE.
47. Jeni, F. A., & Al-Amin, M. (2021). The impact of training and development on employee performance and productivity: An Empirical Study on Private Bank of Noakhali Region in Bangladesh. *South Asian Journal of Social Studies and Economics*, 9(2), 1-18.
48. Lodhi, S. K., Gill, A. Y., & Hussain, I. (2024). 3D Printing Techniques: Transforming Manufacturing with Precision and Sustainability. *International Journal of Multidisciplinary Sciences and Arts*, 3(3), 129-138.