Global Trends in Science and Technology

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

Artificial Intelligence and Machine Learning for Intelligent Data Analytics: Current Trends, Challenges, and Future Directions in Healthcare, Cybersecurity, Blockchain, and Supply Chain Systems

Mohammad Ali[1*]

[1]Independent Researcher Iraq

[1]m.ali.m2000m@gmail.com

open access

Corresponding Author
Mohammad Ali
m.ali.m2000m@gmail.com

Article History:
Submitted: 10-05-2026
Accepted: 21-06-2026
Published: 26-06-2026

Keywords

Artificial Intelligence, Machine Learning, Data Analytics, Healthcare Analytics, Cybersecurity, Blockchain Technology, Supply Chain Management, Deep Learning.

ABSTRACT

Artificial Intelligence (AI) and Machine Learning (ML) are transforming the landscape of modern data analytics, facilitating intelligent, automated, and data-driven decision-making across various industries.AI and ML are transforming the way modern data is analyzed, by allowing for intelligent, automated and data-driven decision-making in many different areas. This review delves into their use in healthcare, cybersecurity, blockchain, predictive analytics, and supply chain management, offering insights into their ability to enhance precision, streamline processes, and provide timely insights. AI powered systems enable a range of applications such as disease diagnosis, threat detection, secure data sharing, forecasting, and logistics optimization. While these advantages are notable, obstacles like data quality problems, privacy concerns, algorithmic bias, and computational challenges are still formidable hurdles. New technologies such as generative AI, federated learning and explainable AI are overcoming these challenges. In conclusion, AI and ML are transforming data analytics into a more intelligent and adaptive field.

INTRODUCTION

In the current digital era, Artificial Intelligence (AI) and Machine Learning (ML) are becoming transformative technologies that are significantly altering the data analytics landscape. As the volume of data continues to expand due to digital platforms, sensors, health care records, financial transactions, supply chain networks, and more, the demand for intelligent systems to analyze them for insights is growing rapidly [1]. Although traditional data analytics approaches are still relevant,

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

they can be difficult to apply in today's data-driven environments, particularly when dealing with large volumes, high velocity, and high volume data. AI and ML technologies have proven to be effective solutions to this challenge by facilitating the processing of vast and diverse datasets, automated learning, pattern recognition, and predictive decision-making [2].

AI's adoption with data analytics has taken organizations beyond descriptive analytics (what happened) to predictive and prescriptive analytics (what will happen and what should be done). At the heart of this change are machine learning algorithms, including supervised learning, unsupervised learning, and reinforcement learning [3]. They can learn from new data without needing to be programmed and enable a system to continually improve its performance. Consequently, the industries have turned to AI-powered analytics to boost efficiency, cut down on operational expenses, and make better decisions [4].

The application of AI analytics is transforming patient treatment and diagnosis in the healthcare sector.AI-driven analytics is spearheading personalized treatment and diagnosis in healthcare. Intelligent systems are leveraging their power to detect anomalies, ward off intrusions, and take action against constantly shifting threats in the field of cybersecurity [5]. AI and blockchain work synergistically to improve data security, transparency, and trust, particularly in decentralized systems. Likewise, machine learning-driven predictive analytics is crucial for forecasting trends, risk identification, and business optimization. AI can help with demand forecasting, inventory optimization, supply chain planning, and resilience against disruptions in supply chain systems [6].

While these developments are promising, the use of AI in data analytics isn't without its difficulties. Issues such as data privacy, algorithmic bias, lack of interpretability, and high computational requirements continue to pose significant barriers. In addition, the scalability, security and ethical considerations of AI systems within the existing infrastructure must be taken into account [7]. The challenges underscore the importance of ongoing research and development efforts to guarantee that AI technologies are effective, responsibly developed and trusted [8].

The aim of this review is to give a comprehensive overview about the current implementation of AI and ML in different areas of data analytics, including health care, cybersecurity, blockchain and predictive analytics, and supply chain systems. It also seeks to recognize emerging trends, shed light on current challenges and investigate future research avenues that can further enrich the capability of intelligent data-driven systems. This research aims to build on the current understanding of these aspects by integrating them to create a comprehensive picture of how AI can influence the future of analytics-driven decision making.

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE, MACHINE LEARNING AND DATA ANALYTICS

Artificial Intelligence, Machine Learning, and Data Analytics are the three pillars of modern intelligent systems that offer unique yet complementary features for data processing and interpretation. Once the basics of blockchain are understood, it becomes easier to recognize the impact they have on all kinds of sectors including healthcare, cybersecurity, blockchain, predictive analytics and supply chain management [9].

AI is all about building machines or systems that can do things which are usually done by humans. They involve things like reasoning, problem solving, perception, language understanding and decision making. AI systems are engineered to mimic cognitive processes through algorithms, rules and learning mechanisms which enable them to react intelligently to inputs [10]. In AI, there are several subfields including expert systems, natural language processing, computer vision etc and all these areas contribute to the wide range of applications in AI.

Machine Learning is an integral part of AI, which aims to make systems learn patterns from data without any explicit programming. The algorithms try to learn on their own without following predefined rules and get better with experience [11]. There are basically three types of machine learning: supervised learning, where a model is trained on data with labels; unsupervised learning, in which a model learns from data without labels; and reinforcement learning, a type of learning in which a system learns by receiving a reward or penalty based on the actions it takes in a particular environment. These learning tricks enable machines to work in a changing and complex data landscape [12].

Data Analytics, on the other hand, is the act of analyzing raw data to get significant insights, discover trends, and help with decision-making. It involves various techniques such as data cleansing, data transformation, visualization, and statistical analysis [13]. Traditionally, data analytics had been on descriptive techniques that summarised past data. But, thanks to the combination of AI and ML, analytics has shifted to predictive and prescriptive analytics, allowing organizations to go beyond the analysis of what has happened to predict what will happen next and suggest optimal actions [14].

AI and ML have revolutionized data analytics by making it more powerful in processing high-dimensional, high-volume, and complex datasets. Advancements in techniques—like deep learning, neural networks, and ensemble methods—have enhanced predictive model accuracy and efficiency. The improvements have enabled systems to work on different types of data, such as text, images, audio, and sensor data, resulting in broader and more complete analytics [15]. The core concepts and principles of AI, ML, and Data Analytics offer a conceptual and technical basis for intelligent systems.

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

Thanks to their integration, they are able to convert raw data into actionable insights and intelligence, fueling innovation and efficiencies across various areas of the modern digital economy [16]

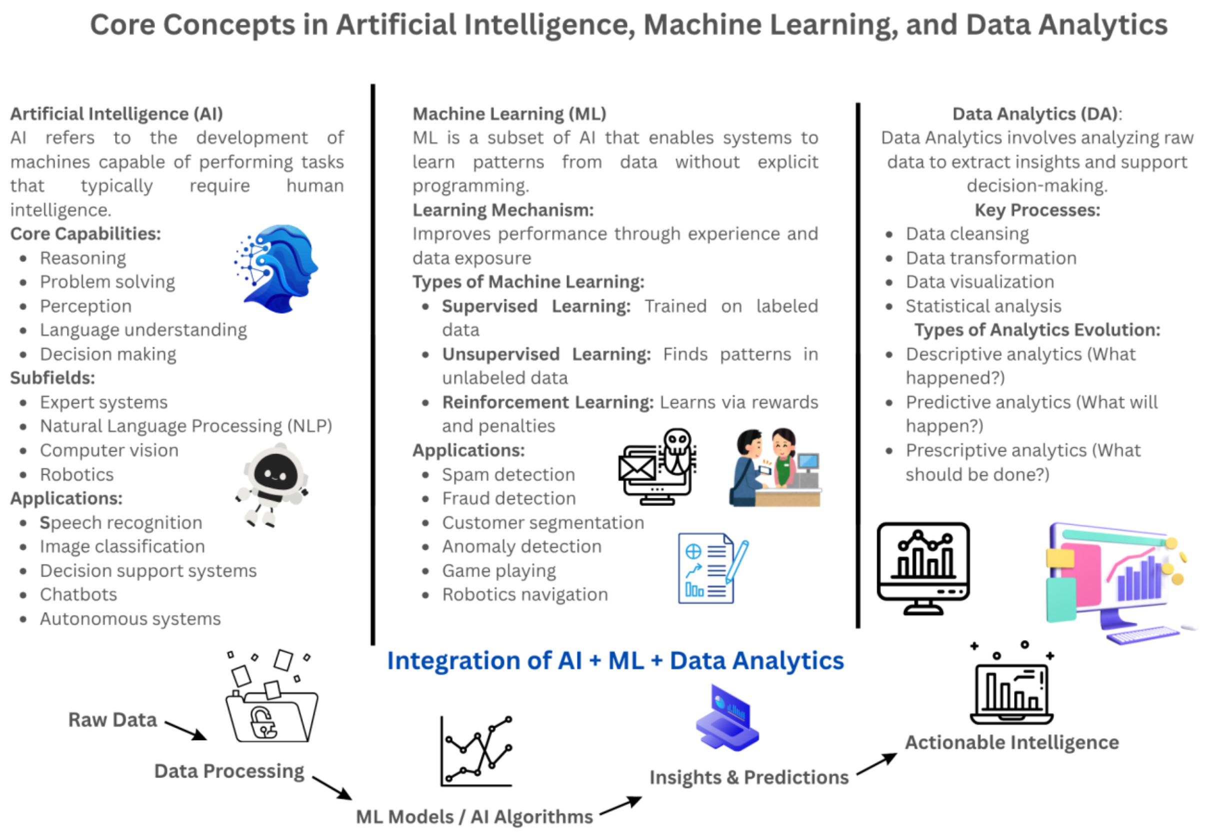

Figure 1. Core Concepts in Artificial Intelligence, Machine Learning, and Data Analytics

AI AND MACHINE LEARNING IN HEALTHCARE ANALYTICS

Artificial Intelligence (AI) and Machine Learning (ML) have revolutionized the healthcare industry, providing a fresh approach to diagnosing patients more accurately, delivering care that is more effective and planed, and improving patient outcomes. There is a vast amount of complex data generated in the healthcare industry [17]. The information is acquired from diverse sources such as electronic health records (EHRs), medical imaging devices, wearables, laboratory reports, and genomic sequencing. This is a complex and extensive data, which is hard to manage and analyze using conventional approaches. This can be addressed by using AI and ML, which can identify patterns, relationships, and insights, and make data-driven clinical decisions [18]. With the increasing digital maturity of healthcare systems, institutional accountability is further enhanced and the successful deployment of AI-powered analytics in health-care settings is facilitated.

One of the most significant applications of AI in healthcare is the prediction and diagnosis of diseases. Machine-learning models can predict the likelihood of diseases like diabetes, cardiovascular diseases

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

and cancer based on patient histories, symptoms and clinical tests [20]. The predictive models help physicians detect the disease early, even before the symptoms appear. Deep learning has been shown to be very useful in medical imaging, especially for automated analysis of X-rays, MRIs and CT scans, with high levels of accuracy [21]. This reduces the likelihood of misdiagnosis, and can help radiologists make quicker and more accurate decisions. In addition, the ability to be ready for governance and prepared for institutions is crucial for the deployment of predictive AI systems responsibly and effectively across healthcare organizations [22].

Another important application is personalized medicine, leveraging AI algorithms to analyze genetic information and factors such as lifestyle and treatment history to tailor treatment strategies. Machine learning models can be used to tailor treatment rather than a single "one size fits all" approach by incorporating individual patient biological characteristics [23]. This will aid in the effectiveness of the treatment and reduce the side effects of treatments. AI is also an important contributor to the drug discovery sector, as it can process extensive amounts of biochemical data to quickly and effectively identify potential drug candidates, which is far more efficient and faster than traditional laboratory research [24].

Agriculture analytics is yet another key application. AI can process the results of these systems to generate insights from vast quantities of data collected from a variety of sensors, drones, satellites, weather stations and farm management systems. In agriculture, they are adopted for their capacity to integrate a variety of data from different sources, including weather, plant growth, soil condition, etc., and generate insights to aid various agricultural operations [25].

Besides clinical use, AI is being utilized in hospital management systems to optimize resources, make patient scheduling, and load balancing more efficient. Predictive analytics can help predict hospital admissions, helping to optimize staffing, bed availability and medical supplies. AI-enables smart health wearables are the always-on monitoring tool that can trigger warnings of abnormal patient vital signs to the healthcare providers for proactive and preventive health care [26]. Good governance systems are also vital to the future of digital health, especially in humanitarian and resource-limited contexts, where the quality of institutional coordination affects health service delivery and public health outcomes [27].

While these strides have been made, there are still some obstacles to overcome when it comes to implementing AI in healthcare. There are several great concerns, including data privacy, the security of sensitive medical data, standardization of datasets and regulatory restrictions. Furthermore, in the healthcare industry, the interpretability of AI models is crucial because doctors must understand a model's rationale behind the prediction made before adopting its recommendations [28]. To say that

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

AI and Machine learning are reshaping the healthcare analytics industry is an understatement, as they are bringing about faster, more accurate and more personalized healthcare services. They are anticipated to further improve the quality of healthcare, lower costs, and impact the health landscape in the world as a whole as they evolve [29].

AI-DRIVEN CYBERSECURITY ANALYTICS

With the increasing complexity and volume of cyber threats, AI-powered cybersecurity analytics has emerged as a crucial piece of the puzzle in ensuring the security of modern digital infrastructure. Organizations today are operating in highly interconnected environments, with data constantly flowing across networks and cloud platforms to endpoint devices, and often sensitive data is being transmitted [26]. The existing cybersecurity solutions, which are mostly rule-based and signature-based, are not enough to detect new and sophisticated attacks like APTs, zero-day attacks, and new malware. Artificial Intelligence (AI) and Machine Learning (ML) are more adaptive and intelligent, allowing systems to learn from data patterns, detect anomalies and respond to threats in real time [27].

In the field of cybersecurity, one of the main uses of AI is intrusion detection and prevention. Machine learning algorithms can detect abnormal network traffic patterns that could be signs of unauthorized access or malicious activity. Supervised learning models can be developed using labeled datasets that include patterns of known attacks, while unsupervised learning techniques are well suited for finding unknown or new attacks through the detection of patterns of deviations from normal behavior [28]. These systems are far more accurate in detecting and have fewer false positives than traditional systems.

Another significant aspect is malware detection and analysis. AI models can analyze file activity, code structures, and execution patterns to identify if a file is benign or malicious. Their effectiveness in identifying complex malware variants, which are trying to evade the traditional AV systems, is particularly noteworthy and is where deep learning techniques are proving to be of particular value. AI systems can stay ahead of the curve by adapting to new malware varieties through continuous learning and give proactive protection [29]. Another crucial element of AI-powered cybersecurity is behavioral analytics. Rather than just relying on static signatures, modern systems can analyze user behavior and identify anomalies, such as logins at unusual times, access to restricted resources, or unusual data transfer activities. These behavior patterns can be signs of a compromised account or insider threat [30]. AI systems can assign risk scores to activities and raise alerts if suspicious activity is detected, which allows for quicker incident response.

AI has become a key component in SOCs, helping to automate threat detection and response

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

processes. Automated tools help security analysts sift through mountains of alerts, prioritize them, and even suggest or take action on automated responses. This eliminates the need for human analysts to receive alerts and boosts the effectiveness and efficiency of cybersecurity operations [31]. For more sophisticated systems, reinforcement learning has been employed to learn from previous attack scenarios in an effort to optimize the response strategies.

While the benefits of AI in cybersecurity are undeniable, there are several challenges to consider. A main risk is adversarial attacks, which occur when attackers intentionally alter the input data to fool AI models. Further, there are also data privacy and model bias concerns because of the reliance on large datasets. There is also a constant demand for model updates, as cyber threats change over time and this demands significant computational resources and expertise [32]. AI-powered cybersecurity analytics is a powerful tool that helps fortify digital security, allowing for the detection of threats in a proactive, intelligent, and automated way. With the ever-changing nature of cyber threats, the role of integrating AI and ML in creating resilient and adaptive security solutions to safeguard critical digital assets will persist in the future [33].

BLOCKCHAIN-ENABLED INTELLIGENT DATA ANALYTICS

Combining AI, Machine Learning, and blockchain technology provides a potent tool for improving data analytics through greater security, transparency, and decentralization. At its core, blockchain is a distributed ledger technology that securely, immutably, and transparently tracks transactions. Every block in the chain holds data along with a timestamp and a cryptographic hash of the previous block, making it very hard to modify data in the stored blocks without the consensus of the network [34]. The trust and data authenticity blockchain provides are incredibly important in data-driven environments.

Blockchain offers a secure and trusted platform for data sharing among multiple parties, making it a valuable asset in the realm of intelligent data analytics. Centralized systems are prone to issues like single points of failure, data manipulation, and lack of transparency [35]. The blockchain overcomes these challenges by spreading data among a network of nodes, allowing everyone to have access to the same, accurate version of the data. This can be particularly beneficial in sectors like healthcare, finance, and supply chain, where data integrity and traceability are paramount [36].

By combining AI and blockchain, the analytical power is further strengthened, allowing for secure and trustworthy data processing. Large amounts of quality data are essential for AI algorithms to deliver insights and accuracy. The data powered by AI systems is authentic, tamperproof and traceable, thanks to blockchain [37]. This enhances the trustworthiness of the machine learning models and minimizes the risk of biased or corrupted data affecting the results of the analysis.

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

Furthermore, AI can help streamline the functioning of the blockchain, including the development of new consensus mechanisms, identification of fraudulent transactions, and optimization of network efficiency [37].

Another crucial advancement of blockchain technology is the ability to create smart contracts. These are machine-executable contracts with pre-written rules that are directly programmed into the blockchain. Smart contracts can be used to automate tasks like data validation, access control, and transaction execution in data analytics systems [38]. In supply chain analytics, smart contracts can be programmed to automatically perform a payment when goods are delivered and verified, minimizing delays and administrative burdens. Smart contracts can be further empowered by AI technology, enabling them to respond to changing conditions and make decisions without the need for manual intervention [39].

While the benefits of blockchain analytics are plentiful, there are also several obstacles. A major drawback is scalability; the blockchain's network can slow down and become resource-hungry when handling vast amounts of transactions. Additionally, integrating AI systems with decentralized networks requires significant computational power and advanced infrastructure. Another important issue is privacy, as blockchain's transparency can sometimes make it challenging to ensure confidentiality for sensitive information [40]. To tackle these challenges, various techniques like encryption, zero-knowledge proofs, and private blockchains are being investigated.

PREDICTIVE ANALYTICS WITH AI AND MACHINE LEARNING.

Predictive Analytics with Artificial Intelligence (AI) and Machine Learning (ML) is a significant breakthrough in the data analytics realm that allows businesses to make predictions about future outcomes by looking at historical and real-time data. Predictive Analytics utilizes statistical modeling and machine learning algorithms to discover patterns, trends, and relationships in data that can be leveraged to predict future behavior, unlike descriptive analytics which is mainly used to summarize past events [41]. This has proved to be a crucial feature for various sectors like healthcare, finance, retail, manufacturing and supply chains, where accurate and timely forecasts make a substantial impact on decision-making.

Machine learning algorithms are crucial to predictive analytics, enabling systems to learn from data and adapt over time. Prediction tasks are often approached by supervised learning algorithms like linear regression, logistic regression, decision trees, random forest and support vector machine. These models are trained with labeled data that is, historical data with known outputs, and learns relationships between the variables [42]. These models can be used for forecasting or classification with new data once they are trained. Moreover, deep learning models, such as neural networks, have

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

also significantly improved the predictive ability of models by identifying complex nonlinear relationships in large and unstructured data sets [43].

Another crucial component of predictive analytics is time-series forecasting. It is based on studying data points gathered over a period of time and forecasting the future values. Popular methods for making predictions include ARIMA models, recurrent neural networks (RNNs), and long short-term memory (LSTM) networks. These models are especially useful in conditions that are dynamic, meaning that time-varying variables move quickly and predictions need to be made in a timely fashion [44].

Predictive analytics can also be a great asset in risk assessment and management. In the financial industry, predictive models are applied to analyze credit risk, detect fraudulent transactions, and analyze investment prospects. In the medical field, predictive systems can be used to predict patient readmission rates, disease evolution, and therapy results [45]. Predictive analytics is a powerful tool that can help organizations in their supply chains to predict demand fluctuations, mitigate inventory expenses, and ensure smoother operations.

While predictive analytics offers several benefits, it also has its drawbacks. Inaccurate or missing data is a critical issue too, as it could impact the effectiveness of models. Another common problem is over fitting, which occurs when a model learns too much from the training data and is less effective on new data. In addition, in important applications where transparency is crucial, the interpretability of complex models, particularly deep learning systems, is still a challenge [46].

AI AND MACHINE LEARNING IN SUPPLY CHAIN ANALYTICS

Artificial Intelligence (AI) and Machine Learning (ML) have revolutionized supply chain analytics, transcending their role in merely forecasting demand and predicting product trends to becoming an essential asset for businesses aiming for greater efficiency, resilience, and responsiveness in a rapidly evolving global logistics landscape [47]. Today's supply chains provide enormous amounts of data from a wide variety of sources, such as suppliers, manufacturers, warehouses, transport systems and the end users. The traditional supply chain management practices are based on past data and static planning models, but they are unable to deal with the uncertainties that include changes in demand, transportation delays, geopolitical changes, or sudden market shifts [48]. AI and ML overcome these challenges by offering intelligent solutions based on data, enabling real-time decision-making and predictive capabilities.

Demand forecasting is one of the key uses of AI in supply chain analysis. These machine learning models use historical sales data, seasonal trends, market behavior, and various external factors like weather conditions or economic indicators to forecast sales data with greater accuracy [49]. The use

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

of techniques like regression models, random forests, gradient boosting, and deep learning-based time-series models helps to minimize forecasting errors to help organizations. The accurate prediction of demand enables businesses to keep optimal stock levels, avoid running out of stock and minimize inventory costs [50].

AI-powered analytics also play a key role in inventory management. Smart systems keep track of the stock levels and automatically make replenishment decisions in accordance with the forecasted demand and supply situation. This minimizes the need for manual handling and guarantees that products are available when and where required. AI systems also play a role in inventory classification, like ABC analysis, and optimize warehouse storage strategies for quick retrieval and efficient operation [51].

Logistics and route optimization have also benefited greatly from AI and ML technologies. Traffic flow, fuel usage data, delivery timings and geographic factors are input into machine learning algorithms to identify the most efficient transportation routes. This results in shorter delivery times, lower fuel consumption, and a better customer experience [52]. Reinforcement learning is applied to dynamically reroute traffic in more sophisticated systems during conditions like changing traffic or weather disturbances.

Real-time monitoring systems using IoT devices and AI analytics deliver a continuous view of supply chain activities. Sensors monitor the condition, movement and location of goods, allowing companies to react rapidly if things go wrong or things are lost. This degree of transparency enhances the supply chain network's accountability and coordination. While this offers benefits, there are still hurdles to overcome in adopting AI-powered supply chain analytics [53]. Integrating data from various systems can be challenging, and varying data quality may impact model accuracy.

The high cost of implementing AI infrastructure and the need for skilled professionals can be barriers for many organizations. Additionally, there are issues of cybersecurity and data privacy because of the vast quantity of sensitive operational information that is being handled [54]. AI and Machine Learning are transforming the field of supply chain analytics, making it smarter, more efficient, and more effective. Organizations are working to create more agile, efficient and resilient supply chains that can withstand the ebbing and flowing of the global market thanks to these technologies [55].

COMPARATIVE ANALYSIS ACROSS A DOMAIN

The comparison allows for a deeper understanding of the similarities and differences between AI and ML, and their application to issues in healthcare, cybersecurity, blockchain systems, predictive analytics, and supply chain management. Each domain has its own goals and limitations, but they all share a common goal: to turn vast amounts of data into valuable information. Comparing and

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

contrasting across these areas can aid in identification of transferable techniques, model optimization and cross-sector innovation [56].

Machine learning algorithms for pattern recognition and prediction are one of the most prevalent components found in all of the domains. Predictive analytics, health diagnosis, and supply chain forecasting are some common applications of supervised learning methods like regression models, decision trees, and ensemble techniques [57]. In cybersecurity, unsupervised learning algorithms, such as clustering, have been used for anomaly detection, and in healthcare, for patient segmentation. In all areas where there are unstructured data, like images, text or sensor data, deep learning models like neural networks are increasingly used [58]. But for certain problems, the selection of the algorithm may depend on the type of data being process and the problem itself.

While there are similarities, there are also unique data characteristics and operational needs in each domain. Healthcare data is complex, heterogeneous, and frequently unstructured; it needs to be handled with utmost security and privacy protection, complying with laws and standards like data anonymization and data handling. Cyber security data, however, is extremely dynamic and adversarial, and needs to be processed in real time and learnt in an adaptive manner that can identify changing threats. Blockchain systems focus on the integrity, immutability and decentralization of data, thereby placing limitations on data processing and storage [59]. Data is often spread among the various stakeholders and data systems within the supply chain, and must be well-integrated and synchronized. In a more generic sense, predictive analytics can serve as a stepping stone between and across domains, offering forecasting and decision support functionality [60].

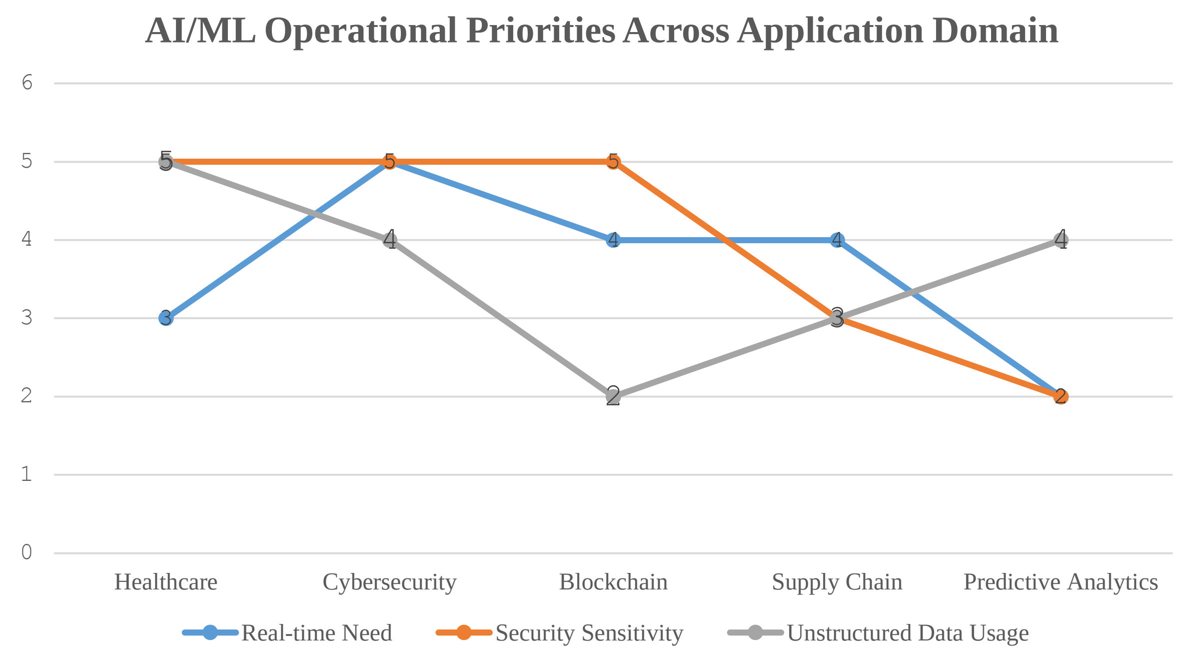

Figure 2. AI/ML Operational Priorities across Application Domain

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

One additional area of comparison is performance measures for each domain. In healthcare, metrics such as sensitivity, specificity, and accuracy are crucial due to the high cost of errors. The false positive and false negative rates are also significant metrics in cybersecurity, as missing a threat can have serious repercussions [61]. Supply chain analytics is about metrics like accuracy of forecasts, inventory turnover and delivery efficiency. Security, transparency, and efficiency of transaction validation are primary concerns in blockchain applications [62]. The different evaluation criteria are indicative of the priorities and risks in the domain.

CURRENT TRENDS AND EMERGING TECHNOLOGIES

Artificial Intelligence (AI) and Machine Learning (ML) is a field that continues to advance at a rapid pace, with ongoing advancements in computational power, data availability, and algorithm development. The domains of healthcare, cybersecurity, blockchain, predictive analytics, and supply chain management are witnessing a transformation in intelligent systems design and deployment as a result of current trends and emerging technologies [63]. The progress of these developments is not only in terms of performance, but is also tackling important challenges like interpretability, scalability, privacy, and automation.

Among the most noteworthy trends that are just starting to become visible are Generative AI models that can generate new content, including text, images, code, and even synthetic data. Large Language Models (LLMs) and diffusion models have transformed NLP and computer vision applications [64]. In data analytics, generative AI is making contributions to augment data, automate report generation, and even simulate complex scenarios in predictive analytics. In the healthcare sector, it aids in summarizing medical reports and drug discovery, and in cybersecurity, it helps with threat intelligence generation and detecting phishing attacks [65].

One trend that is significant is Explainable AI (XAI), which aims to render AI models interpretable and transparent. The transparency of AI models is particularly critical in high-stakes industries such as healthcare and finance, where the decisions made by the system can directly impact lives.In fields like healthcare and finance, where AI decisions can significantly affect lives, transparency is crucial for trust and accountability [66]. Stakeholders can use XAI techniques like SHAP values, LIME, and attention mechanisms to understand model results and assure adherence to ethical and regulatory requirements.

Another privacy-preserving machine learning technique that is emerging is Federated Learning. Federated learning trains models across different decentralized devices or servers, without moving the data, while centralizing learning. This is especially helpful when dealing with sensitive information, such as in medical, mobile applications [67]. It allows for improved privacy whilst at

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

the same time enabling collaborative model training across distributed systems.

Edge AI and Internet of Things (IoT) are other game-changers. From the deployment of IoT devices in smart cities, healthcare monitoring, and industrial automation, there is a need for real-time data processing at the edge of networks. Edge AI facilitates the execution of machine learning models directly on edge devices like sensors, smart phones, and embedded systems, mitigating latency and bandwidth consumption, and enhancing responsiveness [68].

These are complemented by other developments such as automated machine learning (AutoML), reinforcement learning, and hybrid AI systems, which are driving innovation even faster. Building machine learning models is simplified by AutoML and made easier and accessible to non-experts in AI, while reinforcement learning is used in autonomous systems like robotics, supply chain optimization, and cybersecurity defense strategies [69]. The landscape of intelligent data analytics is undergoing a significant shift, thanks to the interplay of existing trends and the rise of new technologies in the world of AI and ML. All of these innovations are making things more efficient, better decision making, and adding new capabilities to industries. As such, these technologies will continue to push the limits of intelligent systems as they become more common [70].

CHALLENGES AND LIMITATIONS

Though AI and ML have made significant strides and become commonplace in data analysis, they still face several challenges and limitations in fields like healthcare, cybersecurity, blockchain, predictive analytics, and supply chain management. The challenges are of a technical, ethical, operational, and organizational nature which makes it hard to fully reliably and universally put AI systems into practice. Data quality and availability is one of the biggest challenges [71]. Large amounts of high-quality data are crucial for AI and ML models to generate reliable and precise outcomes. But real world data is often incomplete, inconsistent, noisy and biased. For instance, in the healthcare sector, patient information might be stored in various systems, or within supply chains, data from different parties might not be harmonized [72]. Data quality directly affects the performance of the model and can result in inaccurate predictions and insights.

Data privacy and security concerns is another drawback. Sensitive data like financial records, medical information, and user behaviour data are essential for many applications of artificial intelligence. This data needs to be kept confidential and protected, particularly in regulated sectors. Cybersecurity threats, data breaches, and unauthorized access continue to be a threat [73]. While high-end encryption and secure structures guarantee information security, sustaining privacy and empowering information-driven analytics is a challenging equilibrium to strike.

Algorithmic bias and fairness are also significant issues. Bias may be unintentionally learned by

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

machine learning models from data, resulting in discriminatory or unfair outcomes. This is especially important in certain fields, such as healthcare and cybersecurity, where misjudged predictions can have serious repercussions [74]. To achieve fairness, it is essential to carefully select the datasets, identify the presence of biases and monitor the behavior of the model. Model interpretability and transparency is another key limitation. Many of the more sophisticated AI models, particularly AI models based on deep learning are "black box" systems, meaning they are often difficult to understand how they make a particular decision. Non-medical applications of AI systems like fraud checks or customer service are less trustworthy because they lack interpretability, which contributes to lower adoption rates [75]. This is where techniques of explainable AI (XAI) are coming in; while there is a long way to go to complete transparency, they do have the potential to help overcome the challenge.
Scalability and computational cost are limitations to deployment of AI systems. Creating complex models is energy-intensive, takes up a lot of computational power and high-end hardware. This can be costly and difficult for small organizations. Further, applications like supply chain monitoring and cybersecurity demand real-time data streams, which calls for strong infrastructure [76]. Other drawback is the lack of skilled personnel. Implementing and maintaining AI systems requires expertise in data science, machine learning, and domain-specific knowledge. The lack of skilled experts within many organizations slows down the rate of adoption and can lead to reliance on outside experts [77].

FUTURE RESEARCH DIRECTIONS

The future of Artificial Intelligence (AI) and Machine Learning (ML) for data analytics will likely involve creating more intelligent, ethical, secure, and autonomous systems that can tackle increasingly complex real-world challenges. With industries like healthcare, cybersecurity, blockchain, predictive analytics, and supply chain management constantly evolving, fresh research avenues are opening up which seek to address the current shortcomings and further enhance the capabilities of intelligent systems [78].

A significant trend is the emergence of hybrid AI systems, which integrate several technologies like AI, blockchain, and the Internet of Things (IoT). These holistic solutions are designed to enhance data security, transparency, and real-time decision-making. For instance, blockchain can guarantee data integrity and AI can process the data for predictive insights, establishing a more dependable and decentralized analytical ecosystem [79]. In industries such as healthcare and supply chain management, where trust and traceability are paramount, such hybrid systems can be of great value.
One of the other research areas is that of autonomous decision making systems. The purpose of these systems is to act autonomously, based on current incoming data and learning. Reinforcement learning

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

and deep learning methods will be significant contributors to the development of autonomous systems in robotics, smart logistics, and cyber security defense system and industry automation, among others [80]. But it is a challenge of research to maintain safety, reliability and accountability in complete autonomous systems. AI systems that are human-centric are also receiving a lot of attention as researchers strive to create systems that reflect human values, ethics and cognition. This encompasses other aspects such as explain ability, usability, and trust in AI systems [81]. For example, in health care, human-centric AI can help doctors but not make decisions on their behalf, which means that AI augments human expertise rather than taking the place of it. This strategy focuses on the cooperative interaction between humans and machines and not automation [82].

Another upcoming area of focus is sustainability, which has given rise to the idea of sustainable AI systems. The computational workload and energy consumption for training large machine learning models are a concern for the environment. Future studies are likely to explore more energy-efficient algorithms, maximize hardware efficiency and minimize the carbon footprint of AI systems [83]. To achieve this, lightweight models and effective learning algorithms will play a crucial role in making AI more environmentally responsible.

The research direction is also being focused on the concept of Industry 5.0. While Industry 4.0 was about the automation and digitization, Industry 5.0 is all about the collaboration between humans and smart machines. This is designed to blend human creativity with machine accuracy, especially in manufacturing, health care and service sectors. In this context, AI systems are not intended to take the place of human beings but rather to augment their abilities [84]. There will likely be further developments in federated learning, edge AI, and privacy-enhancing machine learning, which will address increased privacy and security concerns [85]. The methods allow for distributed learning without the need for a central repository and ensure that AI applications are more secure and compliant with regulations. The future of AI and ML in data Analytics will be characterized by more comprehensive, ethical, efficient, and human-centered systems [86]. These innovations will not only enhance technological functionality but also help to align AI technologies with the needs of society, sustainability objectives, and global regulatory frameworks.

CONCLUSION

Artificial Intelligence (AI) and Machine Learning (ML) have become powerful agents of change in the world of data analytics, revolutionizing data collection, processing, interpretation, and use across various sectors. They've been discussed in the healthcare sector, cybersecurity, blockchain, predictive analytics and supply chain systems, among others, with a focus on their vast potential and the challenges they face. AI integration with advanced analytics has propelled businesses to shift from

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

descriptive insights to predictive, prescriptive, and intelligent business decisions.

In each of the discussed areas, AI and ML have proven effective at deriving valuable insights from large, complex, and diverse datasets. In the medical field, these technologies enhance the precision of diagnostics, facilitate tailored treatments, and facilitate early disease identification. In the field of cybersecurity, they enhance the capabilities of security defenses by identifying anomalies, detecting threats in real time and responding to them adaptively. By integrating blockchain, data is more secure and trustworthy, enabling safe and transparent data exchanges. Predictive analytics provides a competitive edge by using machine learning models to predict future trends, and supply chain systems gain from optimized forecasting, supply chain management and risk mitigation.

However, the review also reveals there are a number of ongoing challenges that need to be tackled to continue to make sustainable progress. Data quality, privacy considerations, algorithmic biases, complexity and interpretability are still major challenges. Furthermore, the scarcity of skilled individuals and the complexity of embedding AI systems in the current infrastructure are still limiting the adoption of AI. The restrictions highlight a need for stronger frameworks, the harmonization of data practices, and responsible AI development.

The overview of current trends and emerging technologies indicates a dynamic situation. The potential of intelligent systems is being expanded continuously with innovations like Generative AI, Explainable AI, Federated learning, Edge AI and Quantum machine learning. These developments not only enhance performance but also tackle key issues like transparency, privacy, and scalability. Simultaneously, emerging trends like hybrid AI systems, human-centered AI, sustainable computing, and autonomous decision-making underscore the evolution towards more unified, ethical, and efficient technologies.

A comparison of the different domains also shows that there are some fundamental principles common to all application areas, but there are some differences as well. This intersection can provide various avenues for innovation across domains, with methods or strategies used in one domain contributing to improvements in another. Cybersecurity techniques, for instance, can enhance the safety of blockchain, and predictive analytics can reinforce the forecasting of supply chains and health-related scheduling.

Finally, AI and ML are not technology only but the essential components of the future digital economy. Their applications in the field of data analytics are rapidly growing, providing the industries with smarter, faster and more accurate decision making. But the full potential can only be realized when there is constant research and responsible innovation to solve ethical, technical and operational challenges. As these technologies evolve and grow more prevalent and mature, they will become

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

instrumental in the development of intelligent, autonomous and interconnected systems that will define the next generation of digital transformation.

REFERENCES

[1]. Wolniak R, Stecuła K. Artificial intelligence in smart cities—applications, barriers, and future directions: a review. Smart cities. 2024 Jun 10;7(3):1346-89.

[2]. Sharma S, Gahlawat VK, Rahul K, Mor RS, Malik M. Sustainable innovations in the food industry through artificial intelligence and big data analytics. Logistics. 2021 Sep 27;5(4):66.

[3]. Dhar Dwivedi A, Singh R, Kaushik K, Rao Mukkamala R, Alnumay WS. Blockchain and artificial intelligence for 5G-enabled Internet of Things: Challenges, opportunities, and solutions. Transactions on Emerging Telecommunications Technologies. 2024 Apr;35(4):e4329.

[4]. Tyagi AK, Tripathi K, Kukreja S, Tiwari S, SU A. Blockchain enabled artificial intelligence for Industry 5.0: Vision, challenges and opportunities. Journal of Autonomous Intelligence. 2024;7(5).

[5]. Shahsavari Y, Dambri OA, Baseri Y, Hafid AS, Makrakis D. Integration of federated learning and blockchain in healthcare: A tutorial. arXiv preprint arXiv:2404.10092. 2024 Apr 15.

[6]. Ikegwu AC, Nweke HF, Anikwe CV, Alo UR, Okonkwo OR. Big data analytics for data-driven industry: a review of data sources, tools, challenges, solutions, and research directions. Cluster Computing. 2022 Oct;25(5):3343-87.

[7]. Rejeb A, Keogh JG, Zailani S, Treiblmaier H, Rejeb K. Blockchain technology in the food industry: A review of potentials, challenges and future research directions. Logistics. 2020 Oct 26;4(4):27.

[8]. Ghadi YY, Mazhar T, Shahzad T, Jaghdam IH, Khan S, Khan MA, Hamam H. A hybrid AI-Blockchain security framework for smart grids. Scientific reports. 2025 Jul 1;15(1):20882.

[9]. Razzaq K, Shah M. Next-generation machine learning in healthcare fraud detection: Current trends, challenges, and future research directions. Information. 2025 Aug 25;16(9):730.

[10]. Erdenetsogt T, Jamal M. Artificial Intelligence in Computer Vision: Methods and Applications Review. American Journal of Artificial Intelligence and Computing. 2026 Apr 25;2(1):92-108.

[11]. Ferreira AC, Francisco MB, De Pinho AF. The use of artificial intelligence in supply chain management: Systematic literature review and future research directions. IEEE Access. 2025 Aug 28.

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

[12]. Singh A. Fifty Years of Computer Science: Trends, Milestones, and Emerging Challenges. Global Research Repo. 2025 Sep 9;1(2):230-53.

[13]. Rane N, Choudhary S, Rane J. Leading-edge Artificial Intelligence (AI), Machine Learning (ML), Blockchain, and Internet of Things (IoT) technologies for enhanced wastewater treatment systems. Machine Learning (ML), Blockchain, and Internet of Things (IoT) technologies for enhanced wastewater treatment systems (October 31, 2023). 2023 Oct 31.

[14]. Kunnipurayil S, Mohammed M. Advanced Manufacturing and Process Optimization in Medical Device Production. Global Trends in Science and Technology. 2026 Apr 16;2(2):175-98.

[15]. Tanwar S, Bhatia Q, Patel P, Kumari A, Singh PK, Hong WC. Machine learning adoption in blockchain-based smart applications: The challenges, and a way forward. IEEE access. 2019 Dec 23;8:474-88.

[16]. Singh A. Data-Driven Intelligence: Emerging Architectures for Scalable and Responsible AI Systems. Global Trends in Science and Technology. 2026 May 1;2(2):240-62.

[17]. Bellagarda JS, Abu-Mahfouz AM. An updated survey on the convergence of distributed ledger technology and artificial intelligence: Current state, major challenges and future direction. IEEe Access. 2022 May 9;10:50774-93.

[18]. Kabeer MM. Quality by Intelligence: A Review of AI Applications in Healthcare Product Lifecycle Management. Global Research Repo. 2025 Nov 30;1(4):126-47.

[19]. Bhuiyan MI, Mumu TB. Assessing the Nexus between Digital Maturity and Institutional Accountability in Bangladesh’s Public Health System: A 2022 Cross-Sectional Analysis. Journal of Medical and Health Studies. 2022 Oct 30;3(4):192-200.

[20]. Raza H, Erdenetsogt T, Singh A, Farooq M, Kabeer MM, Aslam MS. A Comprehensive Review on Data Science Frameworks for Big Data Analytics. PERFECT: Journal of Smart Algorithms. 2026 Jan 6;3(1):1-0.

[21]. Yu J, Shvetsov AV, Alsamhi SH. Leveraging machine learning for cybersecurity resilience in industry 4.0: Challenges and future directions. IEEE access. 2024 Oct 17;12:159579-96.

[22]. Imtiaz N, Kundu TR, Roy A, Bhuiyan MI, Rahman K, Islam MK. Governance readiness beyond predictive performance: An empirical benchmark for higher-education early warning systems. Frontiers in Computer Science and Artificial Intelligence. 2025 Jul 10;4(5):49-65.

[23]. Jamal A, Raza H, Erdenetsogt T, Singh A, Farooq M, Kabeer MM, Aslam MS. AI and Data Analytics for Precision Agriculture: Current Progress and Future Directions. JATAED:

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

Journal of Appropriate Technology for Agriculture, Environment, and Development. 2025 Aug 15;2(2):36-46.

[24]. Verma A. Integration of Artificial Intelligence and Blockchain for Hybrid Intelligent Systems With Innovations, Applications, and Future Directions. InAI and Blockchain Applications in the Oil and Gas Industry 2026 (pp. 171-206). IGI Global Scientific Publishing.

[25]. Kabeer MM. AI in Lean Six Sigma: A Review of Industrial Implementations, Benefits, and Barriers. Global Journal of Multidisciplinary Sciences and Arts. 2024 Dec 13;1(2):134-58.

[26]. Neoaz N. Harnessing artificial intelligence for cybersecurity in healthcare and food processing: a review of emerging trends and the role of generative models like ChatGPT. Global Trends in Science and Technology. 2025 Jul 24;1(3):144-62.

[27]. Bhuiyan MI, Akter L. Governance Challenges in Delivering Public Health Services to Rohingya Refugee Populations in Bangladesh: A Field-Informed Institutional Analysis. International Journal of Law and Politics Studies. 2021 Sep 25;3(1):29-40.

[28]. Raza H, Erdenetsogt T, Kabeer MM, Aslam MS. IoT Generated Big Data Analytics: Trends and Scalability Issues. American Journal of Artificial Intelligence and Computing. 2025;1(2):306-27.

[29]. Shamsuddoha M, Zimmerman H, Nasir T, Sakib MN. Autonomous Supply Chains: Integrating Artificial Intelligence, Digital Twins, and Predictive Analytics for Intelligent Decision Systems. Information. 2026 Apr 15;17(4):371.

[30]. Oad SK. Recent Advances in Artificial Intelligence for Data Science: A Review. Global Journal of Multidisciplinary Sciences and Arts. 2025;2(2):133-52.

[31]. Mohammed M, Kunnipurayil S. Automation and Smart Manufacturing in Medical Device Production. Global Journal of Multidisciplinary Sciences and Arts. 2025;2(2):176-202.

[32]. Singh A. Cross-Domain Trust-Aware Artificial Intelligence for Behavioral Risk Prediction in Pediatric Healthcare, Financial Systems, and Public Decision Environments. Frontiers in Computer Science and Artificial Intelligence. 2025 Dec 28;4(1):07-12.

[33]. Turan MN, Raufi B, Razdar AM. Artificial Intelligence Applications in Cybersecurity: Threat Detection, Challenges, Framework and Future Directions. Immortalis Journal of Interdisciplinary Studies. 2026 Feb 21;2(1):421-39.

[34]. Kabeer MM. AI in Manufacturing Quality Management: A Review of Techniques, Tools, and Industrial Adoption. Global Journal of Multidisciplinary Sciences and Arts. 2024 Dec 11;1(2):46-64.

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

[35]. Singh A. Artificial Intelligence and Its Expanding Role in Computer Science. American Journal of Artificial Intelligence and Computing. 2025 Sep 20;1(2):226-40.

[36]. Raza H, Erdenetsogt T, Farooq M, Kabeer MM, Aslam MS, Lodhi SK. Predictive Analytics for Efficient and Smart Supply Chain Optimization. American Journal of Artificial Intelligence and Computing. 2025 Dec 5;1(2):264-82.

[37]. Singh A. Intelligent Machines: Shaping the Future of Computer Science and Society. Global Research Repo. 2025 Sep 9;1(2):254-78.

[38]. Khan F. Optimization of Power Systems Using AI: A Review of Modern Approaches. Global Journal of Multidisciplinary Sciences and Arts. 2025;2(2):203-24.

[39]. Singh A. Artificial Intelligence in Computer Science and Machine Learning: Advancing Data Analytics. Global Journal of STEM and Society. 2026 Feb 6;1(1):92-106.

[40]. Jamal M. Artificial Intelligence in Healthcare: Leveraging Big Data Analytics and Machine Learning. American Journal of Artificial Intelligence and Computing. 2026 Mar 25;2(1):26-45.

[41]. Khan M, Bacha A. AI-Driven Cybersecurity in Healthcare: The Transformative Potential of Generative AI. Global Research Repo. 2025 Nov 3;1(3):157-81.

[42]. Mohammed M, Kunnipurayil S. Mechanical Design and Manufacturing Processes in Medical Device Development. American Journal of Artificial Intelligence and Computing. 2026 Apr 17;2(1):68-91.

[43]. Zebari GM, Al Musalhi N. A comprehensive review of integrating AI and blockchain security: Innovations, challenges, and future directions. Security and Privacy. 2025 Sep;8(5):e70094.

[44]. Oad SK. Artificial Intelligence in Data Science: A Comprehensive Review. American Journal of Artificial Intelligence and Computing. 2026 Mar 17;2(1):1-25.

[45]. Aloun MS. Synergistic integration of artificial intelligence and blockchain technology: Advancements, applications, and future directions. Journal of Intelligent Systems and Applied Data Science. 2024 Aug

[46]. Kabeer MM. Utilizing Machine Learning for Continuous Process Improvement in Lean Six Sigma. Global Trends in Science and Technology. 2025 May 7;1(2):49-63.

[47]. Erdenetsogt T, Jamal M. Machine Learning for Big Data Analytics: A Comprehensive Review. Global Trends in Science and Technology. 2026 Apr 25;2(2):199-218.

[48]. Bacha A, Sherani AM. AI in Predictive Healthcare Analytics: Forecasting Disease Outbreaks and Patient Outcomes. Global Trends in Science and Technology. 2025 Jan 24;1(1):1-4.

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

[49]. Kabeer MM. Leveraging AI for Process Optimization: The Future of Quality Assurance in Lean Six Sigma. American Journal of Artificial Intelligence and Computing. 2025 May 7;1(1):87-103.

[50]. Sharmeen B, Swetha M, Varma KK. A Comprehensive Survey on Artificial Intelligence Blockchain Integration: Architectures, Applications, Challenges, and Future Directions. Synthesis: A Multidisciplinary Research Journal. 2026 Mar 31;4(1):58-69.

[51]. Kabeer MM. Synergizing AI and Lean Six Sigma: A Comprehensive Review of Smart Quality Assurance Systems. Global Journal of Multidisciplinary Sciences and Arts. 2024 Dec 12;1(2):113-33.

[52]. Ifedayo AE, Olugbade D, Hamid S. Integrating artificial intelligence with blockchain: A literature review on opportunities, challenges, and applications. Blockchain, Artificial Intelligence, and Future Research. 2025 Feb 27;1(1):52-69.

[53]. Oad VD. Artificial Intelligence for Big Data Analytics: A Review of Trends and Challenges. Global Trends in Science and Technology. 2026 Mar 20;2(2):83-102.

[54]. Jagatheesaperumal SK, Rahouti M, Ahmad K, Al-Fuqaha A, Guizani M. The duo of artificial intelligence and big data for industry 4.0: Applications, techniques, challenges, and future research directions. IEEE Internet of Things Journal. 2021 Dec 31;9(15):12861-85.

[55]. Khan F. Neural Networks in Electrical Engineering Applications: A Review. Global Trends in Science and Technology. 2026 Apr 29;2(2):219-39.

[56]. Sarwer MH, Saha TR, Hossain D. Driving business innovation with artificial intelligence, machine learning and blockchain technology. Journal of Business and Management Studies. 2022 Sep 30;4(3):221-30.

[57]. Oad SK. Integration of AI in Data Science: A Systematic Review. Global Trends in Science and Technology. 2026 Mar 18;2(2):64-82.

[58]. Bala I, Pindoo I, Mijwil MM, Abotaleb M, Yundong W. Ensuring security and privacy in healthcare systems: a review exploring challenges, solutions, future trends, and the practical applications of artificial intelligence. Jordan Medical Journal. 2024 Jul 15;58(3).

[59]. Raza A, Badidi E, Hayajneh M, Barka E, El Harrouss O. Blockchain-based reputation and trust management for smart grids, healthcare, and transportation: a review. IEEE Access. 2024 Dec 23;12:196887-913.

[60]. Tyagi AK, Aswathy SU, Abraham A. Integrating blockchain technology and artificial intelligence: Synergies perspectives challenges and research directions. Journal of Information Assurance and Security. 2020 Feb;15(5):1554.

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

[61]. Kabeer MM. AI and Machine Learning in Lean Six Sigma: A Comprehensive Review of the Future of Process Excellence. Global Research Repo. 2025 Nov 26;1(4):104-25.

[62]. Ramamurthy K, Kulanthaivelu S, Jenish SA. Future directions and emerging trends of adaptive artificial intelligence in wireless sensor networks, Internet of Things, and Industrial Internet of Things. Adaptive AI in Sensor Informatics. 2026 Jan 1:291-308.

[63]. Singh A. Advancing Healthcare through AI-Driven Data Analytics: Integrating Machine Learning and Cybersecurity in Modern Computer Science. Global Journal of STEM and Society. 2026 Feb 6;1(1):107-26.

[64]. Almalki J, Al Shehri W, Mehmood R, Alsaif K, Alshahrani SM, Jannah N, Khan NA. Enabling blockchain with IoMT devices for healthcare. Information. 2022 Sep 25;13(10):448.

[65]. Vaigandla KK. Quantum-Secure IoT Networks for the 6G Era: Post-Quantum Cryptography, Blockchain Integration, and Trust Architectures-A Comprehensive Review. Journal of Sensors, IoT & Health Sciences (JSIHS, ISSN: 2584-2560). 2025 Sep 30;3(3):44-75.

[66]. Bhandari A, Cherukuri AK, Kamalov F. Machine learning and blockchain integration for security applications. InBig Data Analytics and Intelligent Systems for Cyber Threat Intelligence 2023 Apr 28 (pp. 129-173). River Publishers.

[67]. Hammad A, Abu-Zaid R. Applications of AI in decentralized computing systems: harnessing artificial intelligence for enhanced scalability, efficiency, and autonomous decision-making in distributed architectures. Applied Research in Artificial Intelligence and Cloud Computing. 2024;7(6):161-87.

[68]. Zhang C, Chen Y. A review of research relevant to the emerging industry trends: Industry 4.0, IoT, blockchain, and business analytics. Journal of Industrial Integration and Management. 2020 Mar 19;5(01):165-80.

[69]. Bacha A, Shah HH, Abid N. The Role of Artificial Intelligence in Early Disease Detection: Current Applications and Future Prospects. Global Journal of Emerging AI and Computing. 2025 Jan 20;1(1):1-4.

[70]. Radanliev P, De Roure D, Page K, Nurse JR, Mantilla Montalvo R, Santos O, Maddox LT, Burnap P. Cyber risk at the edge: current and future trends on cyber risk analytics and artificial intelligence in the industrial internet of things and industry 4.0 supply chains. Cybersecurity. 2020 Jun 2;3(1):13.

[71]. Khan F. CYBERSECURITY AND ELECTRICAL SAFETY IN SMART GRIDS. Spectrum of Engineering Sciences. 2024 Dec 31:637-45.

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

[72]. Shah HH, Bacha A. Leveraging AI and Machine Learning to Predict and Prevent Sudden Cardiac Arrest in High-Risk Populations. Global Journal of Universal Studies. 2024 Dec 15;1(2):87-107.

[73]. Far AZ, Far MZ, Gharibzadeh S, Naeini HK, Amini L, Zangeneh S, Rahimi M, Asadi S. Artificial intelligence for secured information systems in smart cities: Collaborative iot computing with deep reinforcement learning and blockchain. arXiv preprint arXiv:2409.16444. 2024 Sep 24.

[74]. Neoaz N, Bacha A, Khan M, Sherani AM, Shah HH, Abid N, Amin MH. AI in Motion: Securing the Future of Healthcare and Mobility through Cybersecurity. Asian Journal of Engineering, Social and Health. 2025 Jan 29;4(1):176-92.

[75]. HASSAAN A, AKBAR Z, JAMSHAID MM, NIAZ S, AKBAR S, SIDDIQUE MN, TABASAM AH. AI-driven administrative automation: Enhancing operational efficiency and security. TPM–Testing, Psychometrics, Methodology in Applied Psychology. 2025 Oct 10;32(S7 (2025): Posted 10 October):2451-60.

[76]. Jamshaid M, Muhammad AH, Akbar Z, Niaz S, Siddique MN, Akbar S. Artificial intelligence generated deepfakes as instruments of disinformation: Examining their influence on public opinion, digital trust, and governance. Journal of Information Systems Engineering and Management. 2025;10.

[77]. Chowdhury RH. Blockchain and AI: Driving the future of data security and business intelligence. World Journal of Advanced Research and Reviews. 2024 Jul;23(1):2559-70.

[78]. Alharbi S, Attiah A, Alghazzawi D. Integrating blockchain with artificial intelligence to secure IoT networks: future trends. Sustainability. 2022 Nov 30;14(23):16002.

[79]. Jamal M, Aslam MS. From Data to Decisions: AI-Driven Machine Learning in Modern Healthcare. Global Journal of Multidisciplinary Sciences and Arts. 2025;2(2):115-32.

[80]. Oad VD. Intelligent Data Analytics: A Review of AI-Based Approaches. Global Journal of Multidisciplinary Sciences and Arts. 2025;2(2):153-75.

[81]. Sarker IH. Machine learning for intelligent data analysis and automation in cybersecurity: current and future prospects. Annals of Data Science. 2023 Dec;10(6):1473-98.

[82]. Bala I, Pindoo I, Mijwil MM, Abotaleb M, Yundong W. Ensuring security and privacy in healthcare systems: a review exploring challenges, solutions, future trends, and the practical applications of artificial intelligence. Jordan Medical Journal. 2024 Jul 15;58(3).

ISSN : 3079-5761
Volume 2, Number 3, 2026
https://doi.org/10.70445/gtst.2.3.2026.75-98

[83]. Hsiao-Chun H, Der-Chen H, Chin-Ling C. Applications of AI and Blockchain in Origin Traceability and Forensics: A Review of ICs, Pharmaceuticals, EVs, UAVs, and Robotics. Computer Modeling in Engineering & Sciences. 2025;145(1):67.

[84]. Almalki J, Al Shehri W, Mehmood R, Alsaif K, Alshahrani SM, Jannah N, Khan NA. Enabling blockchain with IoMT devices for healthcare. Information. 2022 Sep 25;13(10):448.

[85]. Vaigandla KK. Quantum-Secure IoT Networks for the 6G Era: Post-Quantum Cryptography, Blockchain Integration, and Trust Architectures-A Comprehensive Review. Journal of Sensors, IoT & Health Sciences (JSIHS, ISSN: 2584-2560). 2025 Sep 30;3(3):44-75.

[86]. Bhandari A, Cherukuri AK, Kamalov F. Machine learning and blockchain integration for security applications. InBig Data Analytics and Intelligent Systems for Cyber Threat Intelligence 2023 Apr 28 (pp. 129-173). River Publishers.