



Original Article

Challenges and Opportunities in Recent Trends of AI, ML, DS, DA, Blockchain Technologies on IT and Businesses

Minal S. Darekar¹, Mansi D. Shriwastav²

^{1,2} Department of Computer Science, IT & Animation Deogiri College, Chh. Sambhajinagar

Manuscript ID:

IBMIIRJ -2026-030225

Submitted: 08 Jan. 2026

Revised: 12 Jan. 2026

Accepted: 06 Feb. 2026

Published: 28 Feb. 2026

ISSN: 3065-7857

Volume-3

Issue-2

Pp. 126-129

February 2026

Correspondence Address:

Minal S. Darekar

Department of Computer Science, IT &

Animation Deogiri College, Chh.

Sambhajinagar

Email: minalkumbhar2@gmail.com



Quick Response Code:



Web: <https://ibrj.us>



DOI: 10.5281/zenodo.21350064

DOI Link:

<https://doi.org/10.5281/zenodo.21350064>



Creative Commons

Abstract

This study explores transformation of business and IT through the lens of five emerging technology fields: artificial intelligence, Machine Learning, Data Analytics, Data Science and Blockchain. The contemporary business landscape is undergoing a profound transformation driven by the convergence AI, ML, DS, DA, and Blockchain technology. Individually, these technologies offer significant advancements: AI and ML provide sophisticated decision-making and automation capabilities, while data analytics and data science extract actionable insights and non-obvious patterns from vast datasets. Blockchain technology, a decentralized and immutable ledger, establishes a foundation of trust, transparency, and security in data management and transactions. By facilitating automation, data-driven decision-making and Data security all the above technologies transforming number of industries. The synergistic integration of these technologies creates novel business models and powerful operational enhancements in smart contract, Data sharing, Decentralized AI Marketplaces, cybersecurity. Important methods to use with this technology are covered including supervised learning, unsupervised learning, deep learning, descriptive analytics, predictive analytics, prescriptive analytics and distributed ledger technology. The challenges are also discussed, such as data privacy and quality, high cost, skill gap and interoperability. This study highlights opportunities and challenges in current trends available in AI, ML, DA, DS and Blockchain on business and IT sector. Though challenges related to scalability, regulatory compliance, and implementation complexity exist, ongoing technological advancements are actively addressing these barriers. It will be overcome by doing a thorough assessment of recent studies and identifying the potential benefits, impacts, and future directions of all the five technologies.

Keywords: Artificial Intelligence (AI), Machine Learning (ML), Data Science, Data Analytics, Blockchain, Deep Learning, Transparency, Security.

Introduction

Now a days Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), Data Analytics (DA), and Blockchain technologies offer significant opportunities for businesses in areas such as automation, enhanced decision-making, security, personalized customer experience, innovations, increased transparency and supply chain. AI in business and industry uses technologies like machine learning and NLP to automate tasks, analyze massive datasets for insights, personalize customer experiences using chatbots, recommendations, optimize supply chains, and enhance DA are used to rapidly analyze massive, high-quality datasets provides actionable, data-driven insights for better forecasting, risk management, and strategic planning of businesses. Similarly Blockchain is needed in business and IT due to its capacity to provide security and operational efficiency in multi-party scenarios. By leveraging a decentralized, immutable ledger, businesses can streamline processes, cut costs, and enable new, more transparent business models. However, their adoption is difficult by major challenges including scalability issues, data privacy concerns, high implementation costs, and a significant skills gap, ethical issues and issues of interoperability.

Literature Review

AI, ML, DA, DS AND Blockchain Techniques:

Following are some techniques which can be used for the advancement of businesses and IT sector that can play a key role in automation, intelligent, and smart computer systems:

Creative Commons (CC BY-NC-SA 4.0)

This is an open access journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International](https://creativecommons.org/licenses/by-nc-sa/4.0/) Public License, which allows others to remix, tweak, and build upon the work noncommercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

How to cite this article:

Darekar, M. S. & Shriwastav, M. D. (2026). Challenges and Opportunities in Recent Trends of AI, ML, DS, DA, Blockchain Technologies on IT and Businesses. InSight Bulletin: A Multidisciplinary Interlink International Research Journal, 3(2), 126–129. <https://doi.org/10.5281/zenodo.21350064>

- AI techniques that can be used in developing intelligent and smart systems in various real-world application areas are **Machine learning (ML)** which is typically the study of computer algorithms that automate analytical model building, **Supervised learning** This is performed when particular goals are specified to be achieved from a set of inputs. **Unsupervised learning** This is referred to as a 'data-driven method', in which the primary goal is to uncover patterns, structures, or knowledge from unlabelled data. **Deep learning (DL)** [80] is known as another popular AI technique, which is based on artificial neural networks (ANN). (Iqbal H Sarker, 2022).
- Data Analysis and science techniques includes : **1.Descriptive analytics** is used to summarize and analyse historical data. The goal is to identify patterns, trends, and anomalies in past performance. Common techniques include **Aggregating Data, Trend Analysis, Customer Segmentation**. **2. Predictive analytics** uses historical data and statistical models (including machine learning) to forecast future trends and outcomes. Key techniques in predictive analytics include **Regression Analysis, Time-Series Forecasting, Classification and Clustering**. **3. Prescriptive analytics** goes beyond predicting future outcomes to provide actionable recommendations. It uses advanced **algorithms, simulations, and optimization techniques** to suggest the best course of action for achieving business goals. (Lawrence Emma-2024, Adeniran-2024).
- **Blockchain technology**, known as **distributed ledger technology**, is a relatively new form of a database for transaction information stored in a decentralised and transparent manner. The database is run by a network of computers called nodes, so there is no single-point-of-failure, and information can be accessed in real-time. The industry is correctly in line with the concept of the influence on the market of blockchain technologies.(Abid Haleem, Ravi Pratap Singh, Shahbaz Khan, Rajiv Suman, 2021)

Applications of AI, ML, DA, DS and Blockchain in Business and IT Sector

- **Cryptocurrencies:** Cryptocurrencies form an important area of blockchain technology applications. The entire procedure is accomplished through smart contract technology.
Open Bazaar which is a Bitcoin-based multi-signature protected decentralized marketplace that enables free e-commerce transactions with no platform charges.
- **Supply Chain Management Applications:** Blockchain era can enhance transparency and responsibility in deliver chain systems. Blockchain allows high-satisfactory, outcomes, and overall performance of powerful deliver chain control (SCM) processes.
- **Healthcare:** Healthcare Industries are applying AI to make a better and faster diagnosis than humans. AI can help doctors with diagnoses and can inform when patients are worsening so that medical help can reach to the patient before hospitalization.
- **Finance:** AI and finance industries are the best matches for each other. The finance industry is implementing automation, Chabot, adaptive intelligence, algorithm trading, and machine learning into financial processes.
- **Agriculture:** Now a day's agriculture is becoming digital, and AI is emerging in this field. Agriculture is applying AI as agriculture robotics, solid and crop monitoring, predictive analysis. AI in agriculture can be very helpful for farmers.
- **E-commerce:** AI is providing a competitive edge to the e-commerce industry, and it is becoming more demanding in the e-commerce business. AI is helping shoppers to discover associated products with recommended size, color, or even brand.
Integrated Applications for AI, ML, DS, DA and Blockchain can be found in many different industries:
The combination of these technologies leverages AI's analytical power and data management capabilities with the security and transparency of blockchain to create more robust and trustworthy systems.
- **Secure & Transparent Data Sharing:** Blockchain ensures the integrity and provenance of data used for training AI models, leading to more reliable and unbiased AI outcomes.
- **AI-Powered Smart Contracts:** AI algorithms can provide real-time data and insights to automate and optimize the execution of complex smart contracts, making them more dynamic and efficient.
- **Decentralized AI Marketplaces:** Blockchain enables secure marketplaces (e.g., Ocean Protocol) for sharing and monetizing data and AI models without a central authority.
- **Enhanced Cybersecurity:** AI can detect anomalies and potential cyber threats in real- time by analyzing blockchain activity, providing a robust defense against attacks.
- **Auditable AI Decision-Making:** The transparent and immutable nature of a blockchain ledger can record the data and variables used in AI decision processes, making them auditable and explainable (Explainable AI).

Opportunities in AI, ML, DS, DA and Blockchain

- **Enhanced Operational Efficiency & Automation:** AI, ML-driven automation of repetitive and complex tasks, streamlines workflows, reduces errors, and allows employees to focus on higher-value activities.**Superior Decision-Making:** The ability of AI, ML and DS, DA to rapidly analyze massive, high-quality datasets provides actionable, data-driven insights for better forecasting, risk management, and strategic planning.
- **Improved Security and Trust:** Blockchain's immutable ledger enhances data integrity, transparency, and security, which is critical for sensitive data. When combined with AI's threat detection capabilities, it offers a robust defense against cyber threats and fraud.
- **Personalization and Customer Experience:** AI, ML algorithms analyze customer behavior to deliver highly personalized services, recommendations, and 24X7 support via chatbots, increasing satisfaction and brand loyalty.
- **New Business Models and Innovation:** These technologies enable entirely new business models, such as decentralized finance (DeFi), peer-to-peer energy trading, and AI-driven predictive diagnostics in healthcare, opening up new revenue

streams.

- **Supply Chain Optimization:** The combination provides end-to-end traceability of goods, demand forecasting, and automated logistics processes, reducing fraud and inefficiencies.

Challenges in Integrating AI, ML, DS, DA and Blockchain

All these technologies together have many advantages, but there are a few challenges that need to be resolved:

- **Scalability and Performance Issues:** Both AI and many Blockchain networks which can have low transaction throughput face scalability challenges due to high-volume, real-time applications.
- **Data Privacy and Quality Concerns:** AI systems rely heavily on vast amounts of data, which raises significant privacy concerns.
- **High Implementation Costs:** The initial investment required for infrastructure, specialized talent, and integration with existing legacy systems can be substantial, particularly for small and medium-sized enterprises.
- **Talent Shortage and Skills Gap:** There is a significant lack of professionals skilled in both AI, ML and Blockchain technologies.
- **Regulatory Uncertainty and Ethical Issues:** Concerns over algorithmic bias, accountability for AI decisions, and legal compliance across different jurisdictions create uncertainty for businesses.
- **Interoperability:** Bridging the compatibility gap between different AI frameworks, diverse blockchain platforms, and existing enterprise systems is a complex technical challenge.

Methodology

In order to examine and compile recent research on the opportunities and challenges of AI, ML, DA, DS and Blockchain on IT and businesses, this study uses a qualitative review methodology. The chosen papers concentrate on the uses, difficulties, and potential paths of this confluence. Peer-reviewed publications, conference proceedings, and industry reports over the previous five years are some of the data sources. The study looks at research from important industries like healthcare, agriculture, smart contracts, E-commerce, Finance, Supply chain Management and industrial automation. It discusses the opportunities available and limitations in existing technology and identifies the most promising applications of AI, ML, DA, DS and Blockchain.

Discussion

While this study provides some primary understanding of AI, ML, DA, DS and Blockchain technologies drawing on literature, the applications of these technologies demonstrate that more research is required to understand their dynamic nature. The findings show that although these five technologies have individualized benefits, more business value could be derived from harnessing their interconnectivity to accelerate business growth and productivity. There are many advantages to integrating these five technologies such as improved data analysis, automation, and predictive capabilities. Real-time decision-making and increased productivity across industries are made possible by AI, ML algorithms' ability to extract meaningful insights from the vast datasets produced by Blockchain technologies. This section discusses some of the challenges and limitations of these technologies from various stakeholders' point of view.

Results

It is clear from the studied literature that AI, ML, DA, DS and Blockchain technologies have ability to advance many businesses. Through AI, ML-driven automation of repetitive and complex tasks, The ability of AI, ML and DS, DA to rapidly analyze massive, high-quality datasets potentially verified by Blockchain provides actionable, data-driven insights for better forecasting, risk management, and strategic planning. Blockchain's immutable ledger enhances data integrity, transparency, and security, which is critical for sensitive data. AI, ML algorithms analyze customer behaviour to deliver highly personalized services via chatbots, increasing satisfaction and brand loyalty. Supply Chain Optimization: The combination provides end-to-end traceability of goods, demand forecasting, and automated logistics processes. Although there are many advantages the issues occurring due to large data, high cost, data privacy and security, skill gaps and interoperability must be resolved.

Conclusion

From E-commerce and industrial automation to healthcare and agriculture, AI, ML, DA, DS and Blockchain provide a game-changing answer to many of the world's most important business issues. Organizations may create more automated, intelligent, and efficient systems by using AI, ML, DA, DS and Blockchain to build powerful businesses. However, major obstacles pertaining to data security, processing power, data quality, high cost and skill gap must be overcome for AI, ML, DA, DS and Blockchain to be successfully integrated. Future studies should concentrate on increasing data privacy measures, building skill, and creating lightweight machine learning models appropriate for Industries. The result of this study will help business organizations in getting an overview of artificial intelligence and machine learning. This research will be helpful for the organization in understanding the gap between existing methodologies used in operations and the new methodologies which are using a machine learning and artificial intelligence for business operations.

Acknowledgement

We would like to express our sincere gratitude to the Department of Computer Science, IT & Animation, Deogiri College, Chh. Sambhajanagar, for providing the necessary support and academic environment to complete this research work successfully. We are highly thankful to our colleagues and mentors for their valuable guidance, constructive suggestions, and continuous encouragement throughout the study. Their insights greatly contributed to improving the quality of this research. We also extend our appreciation to the authors, researchers, and publishers whose scholarly work has been referenced in this paper. Their

contributions to the fields of Artificial Intelligence, Machine Learning, Data Science, Data Analytics, and Blockchain Technology have laid the foundation for this study.

Financial support and sponsorship

Nil.

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

References

1. Manish Paliwal¹, Meet Patel¹, Nikita Kandale¹, Nilesh Anute¹. *Impact of artificial intelligence and machine learning on business operations*. Journal of Management Research and Analysis. 8(2):70-75, 2021.
2. Iqbal H Sarker. *AI-Based Modeling: Techniques, Applications and Research Issues Towards Automation, Intelligent and Smart Systems*. 2022.
3. Lawrence Emma. *Data-Driven Decision-Making and Business Intelligence in Modern Organizations*. Ladoke Akintola University of Technology. December 2024 .
4. Efunniyi Adediji Adeniran, Osundare, P Omozele Abhulimen . *The role of data science in transforming business operations: Case studies from enterprises*. Computer Science & IT Research Journal 5(8). August 2024.
5. Abid Haleem, Ravi Pratap Singh, Shahbaz Khan, Rajiv Suman *Blockchain technology applications for Industry 4.0: A literature-based review*. ScienceDirect December 2021.
6. Mukta Sharma, Surabhi Shanker. *Block Chain Technology and Its Impact in the Business Environment* International Journal of Service Science, Management, Engineering, and Technology. May 2022.
7. N.H. Patil, S.H. Patel, S.D. Lawand. *Research Paper On Artificial Intelligence And It's Applications*. Computer Science and Engineering. December 2023
8. Shahriar Akter, Katina Michael, Muhammad Rajib Uddin, Grace McCarthy, Mahfuzur Rahman. *Transforming business using digital innovations: the application of AI, blockchain, cloud and data analytics*. Annals of Operations Research 2020.
9. Al Mothana Al Shareef, Serap Seçkiner, Bilal Eid and Hasan Abumeteir. *Integration of blockchain with artificial intelligence technologies in the energy sector: a systematic review*. Frontiers in Energy Research October 2024.
11. Laura Margarita Rodríguez Peralta. *Trends in Data Science and Business Intelligence: Global, National, and Local Perspectives*. Laura Margarita Rodríguez Peralta / Strategy, Technology & Society Vol.18 (2024)