
RESEARCH ARTICLE

Evaluating the Impact of Artificial Intelligence on Risk Assessment in Digital Banking

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ABSTRACT

The introduction of AI has revolutionized how risk assessments are carried out in digital banking, through providing advanced means for fraud detection, credit scoring and real-time monitoring. This study considers the impact of artificial intelligence technologies on credit scoring models in digital banking. By using mixed techniques of qualitative and quantitative analysis alongside case studies and examination of the latest developments, the research explores to what extent the accuracy and efficiency of risk management is enhanced through machine learning, natural language processing and predictive analytics. The findings demonstrate that AI-based approaches can improve efficiency and scalability of RAs, yet also raise new issues as ensuring interpretability and as of regulation and ethics testing. Recommendations for Financial Institutions Conclusion The final section of the paper presents a set of practical recommendations on how to leverage AI solutions responsibly by financial institutions that need to reconcile being innovative with being compliant in the ever-changing landscape of digital finance.

KEYWORDS

Artificial Intelligence, Risk Assessment, Digital Banking, Machine Learning, Fraud Detection

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1. Introduction

The explosion in the development of Artificial Intelligence (AI)-based technologies is revolutionizing the financial industry, and the world of digital banking in particular [1-4]. With the digital platforms being used by banks to provide such services, an efficient, accurate and real-time risk assessment system has become an inevitability [5, 6]. Conventional risk assessment techniques, predominantly manual and rule-based, are challenged to process the volume, variety and velocity of data produced in the digital banking landscape [7, 8]. AI can transform the industry by using machine learning, natural language processing, and predictive analytics to analyze patterns, detect fraudulent activities, and make creditworthiness evaluations with better accuracy and more efficiency [9-11].

Despite the potential, challenges are emerging from the implementation of AI in risk assessment, such as the source of data privacy, legal issues, and ethical concerns [12, 13]. The purpose of this research is to assess the influence of AI on risk assessment in digital banking and to analyze the advantages and threats [6]. Taking the Japanese banking industry as an example, by evaluating existing AI applications and their effects, the study can offer guidance to industry practitioners on how to smartly utilize AI to improve risk management and its affairs in the era of digital [14-18].

2. Literature Review

Several researchers have investigated the effect of AI on the evolution of banking risk assessment [19]. According to Huang et al. (2022), machine learning models increase up value of the prediction of defaulting loans by using various sources rather than just traditional financial information [20-23]. Also, it was proved by Papasavva, Johnson [24] that: AI-based fraud detection systems

provide an acceptable false positive level in comparison to that provided by rule-based systems, by may help quickly deal with the fraudulent activities. NLP approaches have also been adopted to analyze unstructured data of customer feedback, and news reports to predict market risks, such as by Aziz and Andriansyah [25]. What's more, AI-driven predictive analytics enables dynamic risk surveillance that helps banks quickly respond to the ever-evolving market landscape [25]. Nevertheless, emerging issues are also raised in the literature. The black-box properties of some AI models create transparency and explainability concerns that are essential for regulatory compliance [26, 27]. Moral ruminations pertaining to biased data inputs and the danger of discrimination in making credit decisions were raised by Ireni-Saban and Sherman [28], calling for ethical AI governance mechanisms. Taken together, these works highlight AI's promise and the potential for it to transform risk assessment in digital banking, along with the need for reasonable adoption strategies that mitigate its risks [23, 29-33].

3. Research Methodology

This study assesses the effects that AI use has on digital banking risk evaluation through the use of multiple research approaches. Mixing qualitative and quantitative approaches helps the study conduct a thorough analysis. The fundamental sources used in qualitative research consist of case studies combined with banking professional interviews, together with first-hand observations. Organizations utilize these methods to discover human experiences and understand how individuals perceive and deal with AI implementation challenges. Risk management professionals, as well as AI developers, provide vital information about implementation methods and user response through interview processes [34].Fig.1 shows the research methodology.



Figure 1. Research methodology

The data analysis metrics measuring fraud detection rates and customer retention rates, as well as credit default ratios, receive quantitative attention when tracking pre-implementation and post-implementation data. Survey data collected from banking sector employees generates quantitative evidence regarding everyday business operations and risk evaluation precision. The analysis employs correlation alongside regression statistics as tools to study metric relationships and derive final product conclusions.

The research draws from secondary research methods by reviewing past publications and reports and conducting organizational audits to establish a background understanding. Leading banks' case studies, like JPMorgan Chase and HSBC, are good

examples of how AI has changed risk management strategies. Ethical considerations underpin the entire methodology [35]. The handling and analysis of sensitive information abide by data protection laws, with the General Data Protection Regulation (GDPR) being among these. The researchers acquire informed consent from each survey participant and interviewee to maintain ethical research compliance. The integrated research approach provides reliable, advanced insights that address hardware components and human factors within AI risk assessment operations.

4. AI Applications in Risk Assessment

4.1 Credit Risk Assessment

AI has transformed credit risk assessment by making it easy for banks to analyze huge amounts of customer data. This includes financial history, spending behavior, and social behavior [36]. Modern machines achieve higher accuracy in detecting high-risk customers than standard procedures [37]. Table 1. Shows the risk assessment aspect. Key benefits include:

- Enhanced predictive capabilities for loan defaults.
- Faster processing of credit applications.
- Reduced human error in risk evaluation.

Table 1. Risk assessment aspect.

Risk Assessment Aspect	Traditional Method	AI-Driven Technique	Impact/Improvement	Example Bank
Predictive Accuracy	Statistical regression models	Machine learning predictive analytics	~25% improvement in forecasting defaults	Deutsche Bank (illustrative)
Processing Speed	Manual credit scoring	Automated application screening	40% reduction in processing time	JP Morgan Chase
Error Reduction	Human-led evaluation with heuristic rules	Deep learning algorithms minimizing misclassification	50% reduction in evaluation errors	HSBC

4.2 Fraud Detection and Prevention

Fraud detection is one of the important applications of AI in digital banking. AI systems help to analyze transaction data in real-time to find out problems that indicate fraudulent activities. Table 2 shows fraud detection technique. Benefits include:

- Improved accuracy in detecting fraudulent transactions.
- Reduced financial losses due to fraud.
- Enhanced customer trust through secure banking systems.

Table 2. Fraud detection technique.

Technique	Description	Key Benefit	Example Outcome
Real-Time Transaction Monitoring	Continuous surveillance of transactions using AI algorithms	Immediate detection of anomalies	30% reduction in fraudulent transaction losses
Behavioral Analytics	Analyzing transaction patterns against user profiles	Enhanced accuracy in fraud detection	20% improvement in detection rates
Machine Learning Classification	Training models on historical data to flag unusual behavior	Faster decision-making with reduced false positives	35% faster processing of flagged transactions

4.3 Market and Liquidity Risk Management

AI tools help banks to monitor market trends and liquidity risks, which helps to make decisions in advance. Market data undergoes evaluation through predictive analytics and natural language processing, which generates risk prediction outcomes. Table 3 Shows Risk management. Benefits include:

- Timely identification of market fluctuations.
- Improved liquidity management strategies.
- Enhanced resilience to economic shocks.

Table 3. Risk management.

Risk Metric	Traditional Challenge	AI Application	Quantitative Impact
Market Volatility	Delayed response to dynamic market conditions	Real-time predictive analytics	15% decrease in reaction time
Liquidity Shortfalls	Inadequate forecasting of cash flows	Data-driven liquidity prediction models	20% improvement in liquidity management
Stress Testing	Limited scope of manual scenario analyses	Simulation models using machine learning	25% increase in predictive accuracy
Trading Risk	Slow reaction to market shifts	Algorithmic trading integrated with risk controls	18% reduction in risk exposure
Credit Spread Modeling	Difficulty capturing rapid market changes	Advanced pattern recognition techniques	10% enhancement in risk-adjusted returns

5. Challenges and Ethical Considerations

The integration of Artificial Intelligence in digital banking risk assessment brings forward numerous implementation difficulties while raising ethical issues in the process[38]. While AI can transform operations, its use must overcome problems like data privacy risks, algorithmic bias, and regulatory challenges. Fig.2 shows key challenges.

5.1 Key Challenges:

1. **Data Privacy and Security:**
 - Customer privacy suffers from the data volume handled by AI systems because these systems handle extensive sensitive customer information that could be misused or breached. Security of customer information depends on meeting requirements under GDPR and other similar regulations.
 - The priority to secure important data and control access to approved staff members remains vital.
2. **Algorithmic Bias:**
 - If AI models are trained on biased datasets, they can strengthen systemic inequalities. Biased credit risk algorithms possess the potential to create negative impacts on specific demographic groups.
 - Systematic bias detection as well as model vulnerability assessment becomes possible through scheduled inspections of AI systems.
3. **Transparency and Explainability:**
 - Many stakeholders lose trust because many AI systems operate with unexplainable internal procedures. The need for transparency in AI-based risk evaluation frequently arises as both customers and regulatory bodies make their demands .
4. **Operational Complexity:**
 - Organizations need substantial resources to build their AI systems while simultaneously obtaining the proper staff working with this technology. The process of integrating AI into existing systems may cause workflow interruptions while employees develop resistance to the new technological procedures.

6.Ethical Considerations:

- **Fairness:** The development of algorithms requires fairness standards that prevent discrimination from occurring in the system. Fairness must be the main priority for ethical AI development efforts that handle credit scoring and other risk detection operations and fraud protection functions.
- **Human Oversight:** Human oversight within AI-driven processes gives both accountability and ethical compliance.

Ethical Challenges in AI Implementation

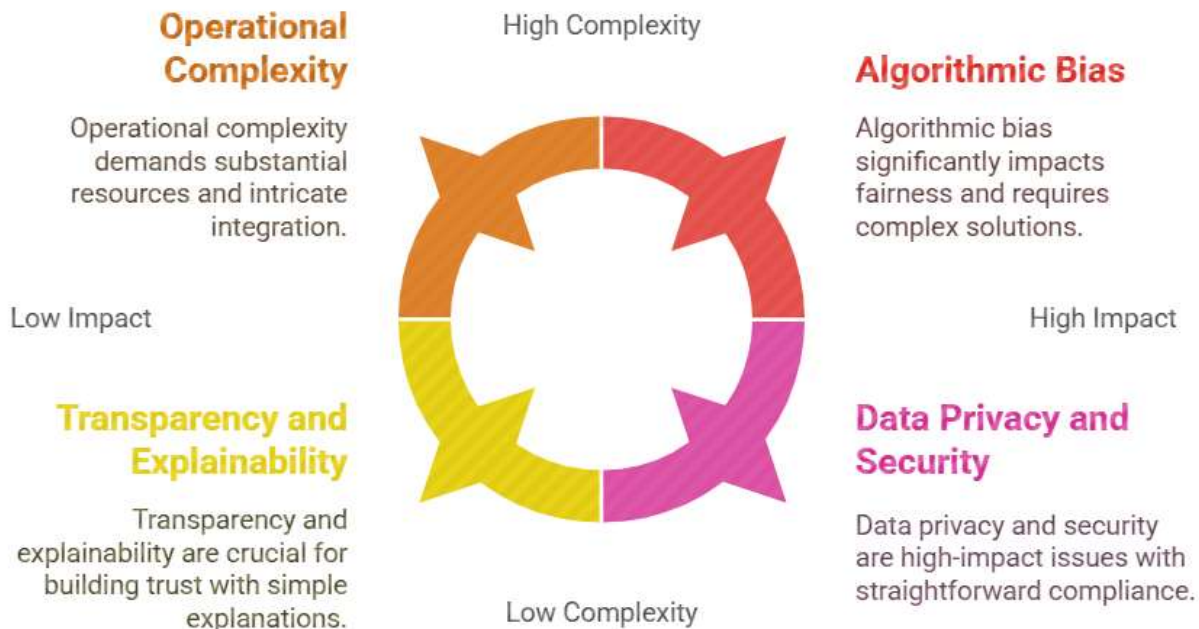


Figure 2. key challenges

7. Case Studies

Evaluating how AI is used in digital banking in real life has a great effect on risk assessment. Below case studies below indicate successful implementation and challenges.

7.1 Successful Implementations:

1. **JP Morgan Chase:**
 - The banking institution JP Morgan utilizes artificial intelligence to refine how it evaluates credit risks. The bank employs machine learning models to conduct detailed analyses of credit histories and spending habits, and repayment patterns, thus improving loan application assessment accuracy.
 - Consequently, there have been decreased loan approval times and reduced default rates [39].
2. **HSBC:**
 - The application of AI technologies by HSBC enables the financial institution to detect and prevent fraud more effectively. Transaction data analysis within real time is performed by adaptive learning systems, which trigger alerts for suspicious activities until further analysis by investigators.
 - The bank achieved both reduced financial losses from fraud incidents and elevated customer trust, together with higher satisfaction rates through its operations.

7.2 Lessons from Challenges:

1. **Algorithmic Bias in Credit Risk:**
 - The implementation of an AI credit scoring model led to negative public reaction after discovering that minority groups suffered from discriminatory application rejections by the system.
 - The situation revealed the necessity of training artificial intelligence models with broad data sets as well as conducting routine bias assessment examinations.
2. **Lack of Transparency:**
 - A significant bank experienced a regulatory inspection when it did not give clear reasons for the decisions made by its AI systems. The situation indicates that explainable AI systems must fulfil requirements from both customers and regulatory bodies.

8. Strategies for Effective AI Integration

The complete application of Artificial Intelligence in financial risk assessment requires institutions to implement strategic solutions that solve technical hurdles along with human resource issues[40]. Below are some important strategies for the use of AI.

8.1 Developing Ethical AI Practices:

- **Bias Mitigation:** The implementation of diverse datasets during training, as well as continuous fairness testing, forms an essential component for bias mitigation.
- **Explainability:** The construction of transparent decision-making processes in AI systems makes it possible for stakeholders to grasp results while developing trust.

8.2 Ensuring Employee Readiness:

- A complete staff training program will enable workers to effectively use AI systems by understanding their capabilities. Training programs can include:
 - Tutorials on interpreting AI-generated risk assessments.
 - Courses on ethical AI usage and compliance.
- Encouraging collaboration between AI developers and banking staff fosters better integration.

8.3 Enhancing Customer Trust:

- Proactively teaching customers about artificial intelligence applications creates positive confidence in them. For example:
- AI system users must receive information about how their creditworthiness is evaluated through AI processing systems.
- These businesses establish the methods they use to protect privacy and ensure fair treatment during operations.

8.4 Technical and Infrastructure Readiness:

- The successful operation of AI systems requires investments in solid information technology infrastructure. This includes:
- The implementation of high-performance computing systems functions to perform real-time risk analysis.
- The use of scalable cloud platforms provides support for processing large-scale data through modern technology solutions.

9. Collaborating with Regulators:

- Financial institutions need to collaborate with regulatory bodies to ensure compliance with developing standards related to AI governance.

9.1 Recommendations:

Adopted strategies enable banks to both reach the full potential of AI technology and decrease operational risks. Constructing a sustainable risk assessment framework depends on developing ethical AI systems together with complete employee training and taking proactive measures to communicate with customers. Table 4. Shows implementation Challenge.

Table 4. Implementation Challenge

Strategy	Advantage	Implementation Challenge
Developing Ethical AI Practices	Promotes fairness, accountability, and transparency	Requires diverse datasets and robust oversight systems
Enhancing Customer Trust	Improves client relationships; bolsters system security	Building and maintaining transparent communication
Ensuring Employee Readiness	Facilitates smooth technology adoption and change management	High training costs and potential resistance to change
Collaborating with Regulators	Helps ensure regulatory compliance and reduce systemic risk	Coordinating across different regulatory standards

10. Future Trends

10.1 Emerging AI Technologies

- **Explainable AI:** Enhancing transparency in decision-making processes.
- **Blockchain Integration:** Improving data security and compliance.

10.2 Predictions

Risk assessment in the digital banking sector will transform because of AI advancements and technologies. Analysis shows that digital banking institutions will begin using artificial intelligence tools actively to prevent risks.

11. Conclusion

With the advancements in digital banking, the importance of AI in risk analysis has never been more prominent. Meanwhile, from the a-nalysis of existing applications and challenges, the following conclusions are also available:

- ❖ AI greatly enhances the accuracy and speed of risk assessment in digital banking, providing more accurate credit risk assessment, fraud detection, and assessment of operational risks.
- ❖ According to him, enabling capabilities such as advanced AI techniques including machine learning-based algorithms and predictive analytics, that facilitate continuous real-time monitoring of all financial activities, are helping banks take quicker decisions and better manage risk.
- ❖ However, this tremendous potential also brings with it serious concerns about transparency of black-box or other complex algorithms, meeting new regulations, and troubling ethical elements such as data bias or data fairness.
- ❖ It is imperative for financial services institutions to responsibly adopt AI technologies, so that innovation is not at the expense of sound risk management or customer trust.

Continued research, cooperation between stakeholders, and development of explicit regulatory guidelines are needed in efforts to address risks associated with the deployment of AI, and to support sustainable ethical growth in digital banking risk assessment.

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References

1. Kaya, O., et al., *Artificial intelligence in banking*. Artificial intelligence, 2019.
2. Md Alamgir Miah1, et al., *Ethical Considerations in AI and Information Technology Privacy and Bias*. International Law Policy Review Organizational Management, 30 Aug 2024. **1**(1): p. 37.
3. Manik, M.M.T.G., *Biotech-Driven Innovation in Drug Discovery: Strategic Models for Competitive Advantage in the Global Pharmaceutical Market*. J. Comput. Anal. Appl, 2020. **28**(6): p. 41-47.
4. HASAN, M.N., et al., *Multi-Omics system based on predictive analysis with AI-driven models for Parkinson's disease (PD) neurosurgery*. Journal of Medical and Health Studies, 2021. **2**(1): p. 53-62.
5. Abikoye, B.E., et al., *Real-time financial monitoring systems: Enhancing risk management through continuous oversight*. GSC Advanced Research and Reviews, 2024. **20**(1): p. 465-76.
6. Hossain, M., et al. *Data Analytics for Improving Employee Retention in the US Technology Sector*. in *2024 International Conference on Intelligent Cybernetics Technology & Applications (ICICyTA)*. 2024. IEEE.
7. Debnath, A., et al. *Analyzing and Forecasting of Real-Time Marketing Campaign Performance and ROI in the US Market*. in *2024 International Conference on Intelligent Cybernetics Technology & Applications (ICICyTA)*. 2024. IEEE.
8. Chowdhury, S.S., et al., *Transforming Business Strategies: Management Information Systems, IoT, and Blockchain Technology to Advance the United Nations' Sustainable Development Goals*. American Journal of Computing and Engineering, 2023. **6**(1): p. 94-110.
9. Aziz1*, M.B., *Navigating the AI Revolution in Business Management: New Strategies and Innovations*. Progress on Multidisciplinary Scientific Research and Innovation, 18 Aug 2024. **1**(1): p. 9.
10. Biswas, B., *IT in Improving Integrity and Productivity in Supply Chain Management*. Transactions on Banking, Finance, and Leadership Informatics, 15 Aug 2024. **1**(1): p. 1-7.
11. Wafi Danesh, N.M., S Bhowmick, Md Shamaul Alam, *A Proposal for Introduction of Geothermal Energy to the Energy Sector of Bangladesh*. International Journal of Science and Advanced Technology, March, 2011. **1**.
12. Imran, M.A.U., et al. *A Predictive Analysis of Tourism Recovery Using Digital Marketing Metrics*. in *2024 International Conference on Intelligent Cybernetics Technology & Applications (ICICyTA)*. 2024. IEEE.
13. Hu, X., et al., *TOP-ALCM: A novel video analysis method for violence detection in crowded scenes*. Information Sciences, 2022. **606**: p. 313-327.
14. Hossain, M.S., *Ecotourism and Wildlife Monitoring: Technological Innovations and Business Opportunities*. Journal of Business Venturing, AI and Data Analytics 20 Aug 2024. **1**(1): p. 19.
15. Manik, M., et al., *Leveraging AI-powered predictive analytics for early detection of chronic diseases: A data-driven approach to personalized medicine*. Nanotechnology Perceptions, 2021. **17**(3): p. 269-288.
16. Debnath, A., Sharmin, S., Vanu, N., Hossain, A., Riipa, M. B., Sabeena, A. A., ... Saha, S. (2023). , *Developing Predictive AI Models for Securing U.S. Critical Infrastructure Against Emerging Cyber Threats* Journal of Posthumanism, (3(3)): p. 333–350.
17. Wafi Danesh, N.M., S Bhowmick, S Alam, *A proposal for large scale electricity generation from high pressure applications using piezoelectric materials*. International journal of science and advance technology, 2011/3. **1**: p. 14-19.

18. Hassan, M.M., et al. *Improving Loan Approval Decisions: The Impact of Data Balancing on the Classifier's Performance in Predicting Borrower Reliability*. in *2024 27th International Conference on Computer and Information Technology (ICCIT)*. 2024. IEEE.
19. Sufia Zareen, K.H., Mohd Abdull Al Mamun, and Samia Hasan Suha, *Machine Learning-Based Intrusion Detection Systems (IDS) for real-time cyber threat monitoring*. *World Journal of Advanced Research and Reviews*, 2022/8/29. **15**(2): p. 863-872.
20. Md Abdullah Al Mahmud1, D.J.P.S. , and M.H. , *Implementing Agile IT Management: A Path to Enhanced Business Flexibility and Responsiveness*. *Progress on Multidisciplinary Scientific Research and Innovation*, 18 Aug 2024. **1**(1): p. 21.
21. Md Abdullah Al Mahmud1, M.S.I. , and R.K.S. , *Artificial Intelligence in Business: Prospects and Dangers*. *Journal of Business Venturing, AI and Data Analytics*, 20 Aug 2024. **1**(1): p. 26.
22. Khatun, M. and M.S. Oyshi, *Advanced Machine Learning Techniques for Cybersecurity: Enhancing Threat Detection in US Firms*. *Journal of Computer Science and Technology Studies*, 2025. **7**(2): p. 305-315.
23. Hossain, M.A., et al., *IT Management Strategies for Implementing Personalized Marketing with Machine Learning in the US Retail Sector*. *Journal of Posthumanism*, 2023. **3**(3): p. 10.63332.
24. Papasavva, A., et al., *Application of AI-based Models for Online Fraud Detection and Analysis*. arXiv preprint arXiv:2409.19022, 2024.
25. Aziz, L.A.-R. and Y. Andriansyah, *The role artificial intelligence in modern banking: an exploration of AI-driven approaches for enhanced fraud prevention, risk management, and regulatory compliance*. *Reviews of Contemporary Business Analytics*, 2023. **6**(1): p. 110-132.
26. Doshi-Velez, F., et al., *Accountability of AI under the law: The role of explanation*. arXiv preprint arXiv:1711.01134, 2017.
27. Hossen, A., et al. *A Predictive Framework for Financial Crashes Using Advanced Time Series Techniques*. in *2024 International Conference on Progressive Innovations in Intelligent Systems and Data Science (ICPIDS)*. 2024. IEEE.
28. Ireni-Saban, L. and M. Sherman, *Incorporating Intersectionality into Ai Ethics*, in *Democracy and Fake News*. 2020, Routledge. p. 40-52.
29. Shafi, S.B., et al., *ARTIFICIAL INTELLIGENCE IN BANKING: TRANSFORMING BANK MANAGEMENT AND CUSTOMER EXPERIENCE*. *Cuestiones de Fisioterapia*, 2023. **52**(3): p. 337-348.
30. Rabby, H.R., et al. *Coronavirus Disease Outbreak Prediction and Analysis Using Machine Learning and Classical Time Series Forecasting Models*. in *2024 International Conference on Artificial Intelligence and Quantum Computation-Based Sensor Application (ICAIQSA)*. 2024. IEEE.
31. Hassan, M., et al., *Applying Business Intelligence to Minimize Food Waste across US Agricultural and Retail Supply Chains*. *Journal of Posthumanism*, 2023. **3**(3): p. 315-332.
32. Danesh, W., et al., *A Review of Neural Networking Methodology to Different Aspects of Electrical Power Systems*. *International Journal of Science and Advanced Technology*, 2011. **1**(1): p. 1-7.
33. Hossen, A., et al., *Machine Learning Models To Predict Market Movements Based On Historical Price Data And Economic Indicators*. *International Journal of Central Banking*, 2024. **20**(1): p. 497-506.
34. Basak, S., M.D.H. Gazi, and S. Mazharul Hoque Chowdhury. *A Review Paper on Comparison of different algorithm used in Text Summarization*. in *International Conference on Intelligent Data Communication Technologies and Internet of Things*. 2019. Springer.
35. Rahman, M.B., et al., *Appraising the historical and projected spatiotemporal changes in the heat index in Bangladesh*. *Theoretical and Applied climatology*, 2021. **146**(1-2): p. 125.
36. Hussain, A.H., et al., *Enhancing cyber security using quantum computing and artificial intelligence: A*. 2021.
37. Faheem, M.A., *AI-Driven Risk Assessment Models: Revolutionizing Credit Scoring and Default Prediction*. *Iconic Research And Engineering Journals*, 2021. **5**(3): p. 177-186.
38. Md Maruful Islam, A.H.H., Md. Nayeem Hasan, Sharmin Sultana Akhi, Mohammad Sajjad Hossain, Sanjida Islam, *Fraud detection: Develop skills in fraud detection, which is a critical area of business analytics*. *World Journal of Advanced Research and Reviews*, 2023. **18**: p. 1664-1672.
39. Vyas, A., *Revolutionizing Risk: The Role of Artificial Intelligence in Financial Risk Management, Forecasting, and Global Implementation*. *Forecasting, and Global Implementation* (April 21, 2025), 2025.
40. Shekh Tareq, A., *Enhancing Intrusion Detection Systems with Ai: Examine the Integration of Ai into Traditional Ids to Improve Detection Rates and Reduce False Positives*. *International Journal of Intelligent Systems and Applications in Engineering*, 2024. **12**(22s): p. 2081 – 2095.