WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Machine Learning's Use in Different Aspects of Daily World

Md Jamal Uddin Farhad*

University Canada West, Vancouver, BC V6Z 0E5, Canada
DOI : https://doi.org/10.55248/gengpi.5.1024.3019

A B S T R A C T

Machine Learning (ML) is increasingly shaping our daily lives by transforming industries and solving complex societal challenges. In healthcare, ML enhances diagnostic accuracy, streamlines treatment processes, and improves patient outcomes. In environmental monitoring, it is instrumental in predicting droughts, managing water resources, and optimizing energy usage. ML also plays a crucial role in urban development, contributing to the creation of smart cities and enhancing security through intelligent systems. In education, it helps predict student performance, enabling personalized learning. Additionally, ML aids in mental health monitoring, epidemic prediction, and the development of assistive technologies for people with disabilities. This paper explores how ML is revolutionizing multiple sectors, highlighting its potential to improve quality of life and address critical global issues.

Keywords: Machine Learning; Data Science; Online Fraud; Policy Making.

1. Introduction

Machine Learning (ML) has become an integral part of our daily lives, revolutionizing various sectors and improving efficiency across multiple domains. This technology, which enables computers to learn and make decisions without explicit programming, has found applications in diverse fields, from healthcare and environmental monitoring to urban development and education. The rapid advancement of ML algorithms, coupled with the increasing availability of big data and computational power, has led to its widespread adoption in both public and private sectors. As a result, ML is now shaping the way we interact with technology, make decisions, and solve complex problems in our everyday lives.

In healthcare, ML is enhancing diagnostic accuracy and patient care, particularly in areas such as dementia care and disease detection. By analyzing vast amounts of medical data, including patient records, imaging results, and genetic information, ML algorithms can identify patterns and make predictions that aid in early diagnosis and personalized treatment plans. This application of ML has the potential to significantly improve patient outcomes and reduce healthcare costs. Furthermore, ML is being used to develop innovative solutions for remote patient monitoring and telemedicine, which have become increasingly important in the wake of global health crises such as the COVID-19 pandemic [1].

Environmental applications of ML include drought and rainfall prediction, which are crucial for water resource management and climate change mitigation. By processing and analyzing complex environmental data sets, including satellite imagery, weather patterns, and historical climate records, ML models can provide more accurate and timely predictions of environmental phenomena. These predictions are invaluable for agriculture, urban planning, and disaster preparedness. Additionally, ML is being employed in the development of smart energy grids, optimizing energy consumption and promoting the integration of renewable energy sources.

Urban development is benefiting from ML through the creation of smart cities with improved security and privacy measures. ML algorithms are being used to analyze urban data streams, including traffic patterns, energy usage, and public service utilization, to optimize city operations and improve the quality of life for residents. In education, ML classifiers are being used to predict student performance, allowing for early intervention and targeted support. This application has become particularly relevant in the post-COVID-19 era, where there has been a noticeable decline in student performance and a need for more personalized learning approaches [2].

The impact of ML extends to assistive technologies, mental health monitoring, and even epidemic prediction. In the realm of assistive technology, ML is being used to develop more sophisticated and responsive aids for individuals with disabilities, such as advanced speech recognition systems for the hearing impaired or object recognition tools for the visually impaired. Mental health applications of ML include sentiment analysis of social media data to detect signs of depression or other mental health issues, potentially enabling early intervention. As the COVID-19 pandemic demonstrated, ML can play a vital role in addressing global health crises by predicting disease spread, optimizing resource allocation, and aiding in the development of new treatments and vaccines [3, 4].

This paper will explore the various applications of Machine Learning in different aspects of our daily world, highlighting its impact and potential for improving quality of life and addressing complex societal challenges. By examining the current state of ML applications across multiple sectors, we

aim to provide a comprehensive overview of how this technology is shaping our world and what we can expect in the future as ML continues to evolve and integrate into more aspects of our daily lives.

2. Literature Review

Machine learning has become an integral part of various aspects of our daily lives, revolutionizing industries and improving efficiency across multiple domains. In the field of smart cities and cybersecurity, deep learning techniques have been employed to develop effective intrusion detection systems. For instance, a study using datasets such as GPRS, CIDDS001, and UNSW-NB15 demonstrated the effectiveness of a Random Forest-Restricted Boltzmann Network (RF-RBN) model in detecting cyber attacks with high accuracy, sensitivity, and specificity [5] . In environmental sciences, machine learning has been applied to predict hydrological droughts, as exemplified by a study on the Gidra River. This research utilized artificial neural networks (ANNs) and support vector machine (SVM) models to forecast drought conditions based on daily average discharges, achieving an impressive 100% accuracy in predicting hydrological situations [6]. Similarly, in meteorology, machine learning approaches have been employed to estimate and forecast precipitation, with neural networks showing promising results in predicting meteorological characteristics [7].

The applications of machine learning extend to various other domains, including assistive technologies for the visually impaired, education, and mental health. A real-time working model based on object detection has been developed to aid visually impaired individuals in predicting objects in their surroundings, potentially reducing accidents and improving daily routines [8]. In the field of education, machine learning classifiers and artificial neural networks have been used to predict student performance, with a Random Forest algorithm achieving 98% accuracy in identifying at-risk students [9]. Mental health research has also benefited from machine learning, as demonstrated by a study that developed a model to detect depression among Arabic Twitter users using various classifiers, with the Random Forest classifier outperforming others with an accuracy of 82.39% [10]. Additionally, machine learning techniques have been combined with Internet of Things (IoT) technologies to monitor the health and well-being of people with dementia, including the development of an algorithm to detect Urinary Tract Infections (UTI), which is a common cause of hospital admissions for this population.

3. Machine Learning in Online Fraud Detection

Machine learning has become an indispensable tool in the fight against online fraud, offering powerful capabilities to detect and prevent fraudulent activities in real-time [11]. As e-commerce and digital transactions continue to grow, so does the sophistication of fraudsters, making traditional rule-based fraud detection systems increasingly inadequate. Machine learning algorithms, however, can analyze vast amounts of data, identify complex patterns, and adapt to new fraud techniques, providing a more robust and dynamic defense against online fraud [12].

One of the key advantages of machine learning in online fraud detection is its ability to handle imbalanced datasets, which is a common challenge in this domain. Fraudulent transactions typically represent a small fraction of overall transactions, making it difficult for traditional methods to accurately identify them. Advanced machine learning techniques, such as the XGBoost algorithm, have shown remarkable success in addressing this issue, achieving accuracy rates of up to 97% in credit card fraud detection [13]. These algorithms can effectively learn from historical data to identify subtle indicators of fraud that might be overlooked by human analysts or rule-based systems.

The integration of machine learning with other cutting-edge technologies, such as blockchain, is further enhancing the security and transparency of online transactions. Blockchain technology provides an immutable record of transactions, which, when combined with machine learning algorithms, creates a powerful system for detecting and preventing fraud. This synergy not only improves the accuracy of fraud detection but also increases user trust in digital financial systems [14] . Additionally, the use of quantum machine learning approaches, such as Support Vector Machines (SVM) enhanced with quantum annealing solvers, has shown promising results in detecting fraud in highly imbalanced, time-series data, outperforming traditional machine learning methods in both speed and accuracy.

As online fraud continues to evolve, so too must the methods used to combat it. Machine learning algorithms offer the flexibility and adaptability needed to keep pace with these changes. Techniques such as feature engineering and ensemble methods are being employed to further improve the performance of fraud detection models. Moreover, the development of real-time fraud detection systems using machine learning is enabling financial institutions to identify and prevent fraudulent transactions as they occur, minimizing losses and protecting consumers. As research in this field progresses, we can expect to see even more sophisticated and effective machine learning-based fraud detection systems, ensuring the security of online transactions in an increasingly digital world.

4. ML In Executive Leadership and Investment Efficiency

Machine learning (ML) is revolutionizing industries by enhancing decision-making processes and optimizing investment strategies. When applied to corporate finance, ML has the potential to reveal intricate relationships between executive leadership traits—such as CFO power and gender diversity—and firm investment efficiency. Powerful CFOs, often seen as critical decision-makers within firms, have been shown to reduce investment efficiency by fostering underinvestment, a more conservative approach compared to the overinvestment tendencies of powerful CEOs. However, this dynamic shifts in more competitive markets, where CFOs may lean towards overinvestment, complicating investment decisions further [15]. ML can

serve as a vital tool in identifying and modeling these complex relationships by analyzing large datasets to determine how leadership factors influence investment outcomes, even during industry shocks and competitive market shifts.

Further research has indicated that firms with more female executives—especially non-CEO women—tend to exhibit superior investment efficiency. This efficiency stems from reduced tendencies for both overinvestment and underinvestment, which can be especially critical during uncertain economic times or in markets with fewer external pressures. Machine learning techniques can help quantify the impact of gender diversity in top management by sifting through large volumes of financial data and providing real-time insights into how leadership diversity influences decision-making in terms of investment efficiency [16]. ML algorithms can also account for different variables such as CEO competence and external market conditions to provide companies with deeper insights into their investment behaviors.

5. Machine Learning in Healthcare

Machine learning (ML) has become a game-changer in the healthcare industry, transforming everything from diagnostics to patient care and operational efficiency. One of the most powerful applications of ML is in medical imaging, where algorithms are being trained to interpret X-rays, CT scans, and MRI images with remarkable accuracy. For instance, deep learning techniques are now capable of detecting conditions like cancer, cardiovascular diseases, and neurological disorders at much earlier stages than traditional methods. ML models, when fed with vast amounts of medical data, learn to recognize complex patterns and anomalies that may go unnoticed by human experts, ultimately leading to earlier diagnosis and more effective treatment options [1]. This technology is not only enhancing diagnostic accuracy but also reducing the workload on healthcare professionals, freeing up time for more personalized patient care.

Additionally, ML has significantly advanced personalized medicine, a sector where treatments are tailored to the individual based on their genetic makeup and medical history. By analyzing patient data, ML models can predict which treatments will be most effective, offering a precision approach to healthcare that reduces trial and error in prescribing medications or therapies [3] . ML is also improving patient monitoring through the use of wearable health devices that track real-time health metrics such as heart rate, blood sugar levels, and physical activity. These devices can alert both patients and healthcare providers to any concerning changes in health status, which can help prevent hospital readmissions and avoid emergency situations [2]. Furthermore, ML is playing a critical role in optimizing hospital operations, including appointment scheduling, resource allocation, and predictive analytics for patient outcomes. By enhancing decision-making and increasing efficiency, ML is poised to revolutionize healthcare delivery, making it more efficient and patient centric.

6. Machine Learning in Risk Detection and Policymaking

Machine learning (ML) has become an indispensable tool for advancing both policymaking and consumer protection, especially when it comes to real-time risk detection and the prevention of fraudulent activities. One critical application of ML is in website legitimacy verification, where the technology's ability to process and analyze large datasets enables rapid detection of risky or fraudulent online platforms. Machine learning-driven website platforms and browser extensions use complex algorithms to assess a website's risk profile by analyzing various factors such as its security protocols, historical data, and known cyber threats. This approach allows for real-time risk scoring, offering users immediate alerts about potential fraud. The use of such tools not only enhances consumer safety but also offers regulatory authorities an effective mechanism to identify and monitor potentially harmful online platforms. This is crucial as the digital landscape grows and evolves at an unprecedented rate, making it difficult for traditional methods to keep pace with emerging threats. The ability of ML to analyze massive amounts of data and deliver timely, data-driven insights empowers regulators to make informed decisions that protect consumers and ensure the legitimacy of online platforms. Moreover, as digital transactions and interactions increase, these machine learning applications provide a scalable solution for consumer protection on a global scale, ensuring safer online environments for individuals and businesses alike [17].

The role of machine learning in policy-making and evaluation is becoming increasingly prominent, as it enables governments and institutions to make data-driven decisions that are more adaptive and evidence-based. ML's capacity to analyze vast and complex datasets allows policymakers to identify trends, predict outcomes, and craft regulations that are more aligned with real-world conditions and public needs. In sectors such as healthcare, education, and urban planning, ML is transforming the way policies are formulated, evaluated, and refined. For instance, in healthcare, machine learning algorithms can sift through large amounts of medical data to predict disease outbreaks, manage public health resources, and optimize healthcare delivery systems. In urban planning, ML tools can analyze traffic patterns, energy consumption, and infrastructure needs to improve city management and sustainability. Furthermore, ML enhances policy evaluation by providing valuable insights into the effectiveness of social interventions and governmental programs. These data-driven evaluations enable policymakers to assess the impact of policies in real time, adjust them as necessary, and continuously improve governance strategies [18].

Furthermore, ML enhances policy evaluation by providing valuable insights into the effectiveness of social interventions and governmental programs. These data-driven evaluations enable policymakers to assess the impact of policies in real-time, adjust them as necessary, and continuously improve governance strategies. An essential complement to this is data visualization, which provides intuitive and accessible ways to present the outcomes of ML analyses to non-expert stakeholders, allowing for a clearer understanding of complex datasets [19] . Visual representations, such as graphs and interactive dashboards, play a critical role in helping policymakers quickly grasp key insights, trends, and the potential impact of policies. Effective data visualization transforms raw numbers and analytics into meaningful stories, making it easier for policymakers to communicate results and foster

informed decision-making. Additionally, as ML technologies evolve, they promise to make governance more transparent and responsive, enabling policymakers to address challenges like climate change, economic inequality, and public health with greater precision and accuracy. The growing integration of machine learning and data visualization in public governance underscores their importance in transforming modern decision-making processes, offering governments powerful tools to address complex global challenges.

7. Environmental Monitoring and Machine Learning Applications

Machine learning (ML) has become instrumental in various aspects of environmental monitoring, enabling more accurate and efficient predictions for issues like drought and rainfall, which have significant implications for agriculture, water management, and urban planning. **Drought prediction** is one such area where ML models, particularly Artificial Neural Networks (ANNs) and Support Vector Machines (SVMs), have demonstrated high accuracy in forecasting hydrological droughts [6]. These models help in identifying drought conditions early, allowing for proactive water resource management and strategies to mitigate climate change impacts on water scarcity. Similarly, **rainfall prediction** has been enhanced by ML, particularly in forecasting precipitation, which is essential for agriculture and effective government planning in climate-vulnerable regions [7]. These machine learning models allow for more accurate weather predictions, leading to better preparedness for extreme weather events.

In **urban development**, ML is being increasingly utilized in **smart cities** initiatives. Deep learning algorithms, for example, play a crucial role in developing intrusion detection systems for Internet of Things (IoT)-based smart cities [5]. Such systems ensure the security and privacy of citizens in highly interconnected urban environments (López-Cortés et al., 2022). The application of ML also extends to sectors like education and assistive technology. In education, machine learning classifiers are used to predict student performance, enabling educators to identify at-risk students and offer early, targeted support. This application is particularly relevant in the post-COVID-19 era, where many students have experienced academic setbacks [3]. On the other hand, **assistive technologies** are being developed using machine learning to aid visually impaired individuals, with applications such as object detection and environment navigation, significantly improving the quality of life for these individuals [8]. These diverse applications illustrate how machine learning is at the forefront of tackling complex challenges in both the natural and human environments.

8. Conclusion

Machine Learning (ML) has emerged as a transformative force in various aspects of our daily lives, fundamentally reshaping industries and driving innovations that improve efficiency and problem-solving capabilities across sectors. From healthcare to education, environmental monitoring to urban development, the integration of ML has facilitated more informed decision-making and optimized processes, ultimately contributing to the enhancement of quality of life. In healthcare, ML aids in disease detection and patient care, making it possible to predict outcomes and personalize treatments, as evidenced by its growing role in telemedicine and remote patient monitoring [1] . Similarly, in environmental applications, ML's predictive power assists in mitigating climate-related challenges such as drought and water scarcity, offering more accurate forecasts that benefit resource management and disaster preparedness [6].

Moreover, ML has proven to be invaluable in smart city development, contributing to safer, more efficient urban spaces through data-driven decision-making and real-time monitoring systems. It has also revolutionized education by providing tools to predict and enhance student performance, which is particularly crucial in the wake of the disruptions caused by the COVID-19 pandemic [9] . In assistive technology, ML has paved the way for innovations that support individuals with disabilities, such as object recognition tools for the visually impaired, making everyday activities more accessible and safe [8]. Lastly, in mental health and epidemic prediction, ML's ability to analyze large datasets is enabling early detection of conditions like depression and predicting the spread of diseases like COVID-19, thereby playing a critical role in public health and policy planning.

As we continue to advance into an era dominated by data-driven technologies, the potential of ML to address global challenges and improve human life across domains will only grow. Its ability to analyze complex datasets, predict trends, and optimize systems provides unparalleled opportunities for innovation, efficiency, and sustainability. The applications highlighted in this paper demonstrate that as machine learning evolves, it will remain an indispensable tool in crafting solutions for some of the most pressing challenges of our time.

References

[1] López-Cortés, X. A. F. Matamala, B. Venegas and C. Rivera, "Machine-Learning Applications in Oral Cancer: A Systematic Review.," Applied Sciences, vol. 12, no. 11, p. 5715, 2022.

[2] S. Johnson, R. Donner and A. J. Perez, "Comparing Classifiers: A Look at Machine-Learning and the Detection of Mobile Malware in COVID-19 Android Mobile Applications.," in Twenty-fourth International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing, 2023.

[3] W. A. Bakar, N. L. Josdi, M. B. Man and M. A. B. Zuhairi, "A Review: Heart Disease Prediction in Machine Learning & Deep Learning.," IEEE Xplore, 2023.

[4] E. CENGİZ and M. .. Gök, "Reinforcement Learning Applications in Cyber Security: A Review.," Sakarya University Journal of Science, vol. 27, no. 2, p. 481–503, 2023.

[5] L. oja and D. P. Ranjana, "An Intrusion Detection System Using a Machine Learning Approach in IOT-based Smart Cities," Journal of Internet Services and Information Security, vol. 13, no. 1, pp. 11-21, 2023.

[6] W. Almikaeel, L. Čubanová and A. Šoltész, "Hydrological Drought Forecasting Using Machine Learning—Gidra River Case Study.," Water, vol. 14, no. 3, p. 387, 2022.

[7] N. Rana, G. Prasad, A. Sharma, P. M. S, M. A. Kumar and P. H. Aditya, "An Effective Prediction of Rainfall Using Machine Learning Technique," in Fifth International Conference on Electrical, Computer and Communication Technologies (ICECCT), 1012.

[8] S. Joshi, N. Gupta, N. Mitali and G. Yadav, "A Machine Learning Approached Model to Identify the Object for Visually Impaired Person," in 3rd International Conference on Pervasive Computing and Social Networking (ICPCSN), 2023.

[9] M. Agarwal and B. B. Agarwal, "Methodological Implementation for Predicting Student Performance Using Data Mining Classifiers and Machine Learning.," in International Conference on Computing, Communication, and Intelligent Systems (ICCCIS), 2023.

[10] D. A. Musleh, T. A. Alkhales, R. A. Almakki, S. E. Alnajim, S. K. Almarshad, R. S. Alhasaniah, S. S. Aljameel and A. A. Almuqhim, "Twitter Arabic Sentiment Analysis to Detect Depression Using Machine Learning," Computers, Materials & Continua, vol. 71, no. 2, p. 3463–3477, 2022.

[11] M. Chy, "Proactive fraud defense: Machine learning's evolving role in protecting against online fraud," World Journal of Advanced Research and Reviews, vol. 23, no. 3, p. 1580–1589, 2024 a.

[12] D. Dhiman, A. Amita Bisht Kumari, D. H. Anandaram, S. Saxena and K. Joshi, "Online Fraud Detection using Machine Learning," in International Conference on Artificial Intelligence and Smart Communication (AISC), 2023.

[13] M. Chy, "Securing the web: Machine learning's role in predicting and preventing phishing attacks.," International Journal of Science and Research Archive, vol. 13, no. 1, p. 1004–1011, 2024 b.

[14] A. T. Raj, J. Shobana, V. K. Nassa, S. Painuly, M. Savaram and M. Sridevi, "Enhancing Security for Online Transactions through Supervised Machine Learning and Block Chain Technology in Credit Card Fraud Detection.," in 7th International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC), 2023.

[15] M. R. U. Chowdhury, M. A. U. Alam, E. Devos and M. K. H. Chy, "Women in C-suite: Does Top Management Team gender diversity matter? Evidence from firm investment efficiency.," International Review of Financial Analysis, 2024.

[16] M. Chowdhury, O. Buadi, F. Xie and M. Chy, "Do Powerful Cfos Affect Investment Efficiency?," Journal of Economics and Finance, 2024.

[17] M. Chy, "A Machine Learning-Driven Website Platform and Browser Extension for Real-Time Risk Scoring and Fraud," Journal of Multidisciplinary Engineering Science and Technology, 2024.

[18] M. Chy and O. Buadi, "Role of Machine Learning in Policy Making and Evaluation," International Journal of Innovative Science and Research Technology (IJISRT), vol. 9, no. 10, p. 456–463, 2024.

[19] O. N. Buadi and M. K. H. Chy, "Role of Data Visualization in Finance," American Journal of Industrial and Business Management, vol. 13, no. 8, p. 841–856, 2023.