

## A REVIEW OF MACHINE LEARNING ALGORITHM AND REAL WORLD USE CASES IN MODERN ERA

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### Abstract

In the Current times, there are numerous real world challenges that have captured the attention of researcher. These problems cannot be fully addressed using traditional methods. Example include medical diagnosis to help the doctors make quick and accurate prediction, stock price prediction to enhance investment experiences for customers, fraud detection to identify unusual financial transactions in banking institutions, spam detection for automatically identifying and filtering emails, image and speech recognition systems, recommendation systems based on user preferences, detection of malicious URL to improve cyber security, forecasting system and many other similar issues. Machine Learning plays a crucial role in tackling all these real world problems. This paper presents a systematic review and analysis to identify the key components of emerging trends in machine learning techniques and algorithms. The study focus is on basics of Machine Learning techniques including methods algorithms and there applications in solving real world problem.

**Keywords:** Machine Learning, Machine Learning Applications, Machine Learning Techniques.

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### Introduction

Machine Learning (ML) offer several significant advantages in research across the various fields. ML deals with the complex numerous and unstructured databases. ML algorithms are advanced power at identifying patterns and relationships within data, predictions based on the historical data, automate repetitive task, efficiently process and extract meaningful information, crucial capabilities in handling massive data, facilitates the exploration of complex and multidimensional problems that may have nonlinear relationships or interactions between variables. ML is even more valuable in the field of research.

The purpose of study is to provide a basis for future researchers to understand and find the research trends in modern era. Some applications of ML are sentiment analysis, fake email detection, stock prediction, speech recognition, online fraud detection, cyber security, Chabot, virtual assistant and many more. The dataset studied for this review is based on the applicability of research in ML. ML has become important in modern data-driven era as it enables computers to learn and understand patterns from data and make intelligent decisions without being explicitly programmed. It helps in solving real-time and complex problems which we cannot solved with help of traditional approach. The most important thing is that ML is able process large volume

data quickly and accurately. Also, ML has ability to do the task automatically, improves performance and learns from new data this made it a key technology in modern era.

This paper is organized as Motivation is followed by this section which is followed by Materials and Methods, Data Sources and Search Strategy, which is followed by Results and Discussions, Real World Use Cases Where ML Played a Major Role and Conclusion.

### **Motivation**

The motivation behind this study is to highlight the various applications of ML which help to solve real world complex problems with high intensity and accuracy. As we know the data is very large scale which will not be analysed rigorously by human beings. To provide an automated and intelligent system as solution to complex problems its need to emphasis on usage of ML.

### **Materials and Methods**

The purpose of conduction of this research is to highlight the emerging trends and technology used in the field of ML. In this research we provide detailed and systematic overview of various ML technologies and algorithms used according to the problem statement. We conducted this review in three main phases

#### **i. Planning and Data Collection**

In this case we plan for collection of research papers or articles from novels, journals or conference proceedings with latest technologies used in the field of ML. This phase is very crucial from the aspect of good research review.

#### **ii. Systematic Literature Review**

In this phase a detailed analysis of research paper or article is conducted for the accurate interpretation or opinion about the work done by the previous researcher also to gain knowledge about which ML technique gives best result for specific type of problem statement.

#### **iii. Reporting of Review**

Conducting a review is necessary to acquire the deep knowledge about the recent advancement but it is also important to report the review for future researchers who will find out the insights from review reports.

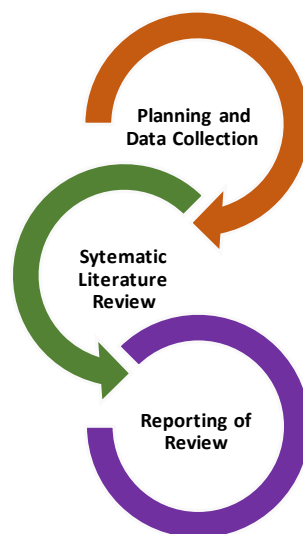


Figure: 1 Methodology for Literature Review

**Data Sources and Search Strategy**

In our study we have used the standard indices such as Scopus, Springer, Google Scholar, IEEE and Web of Sciences where the search for journal papers and conference proceedings for the time span 2019 to 2024. In our literature survey we studied thirty-two journal papers and ten conference proceedings from various national as well as international publications.

**a. Benchmarks for Inclusiveness**

We chose the articles that majorly focuses on the use of ML approaches like classifiers of ML, Algorithms of ML applied on several real-world applications. The papers were accessed and analyzed, which gives emphasis on ML and its practices.

**b. Data Extraction and Synthesis**

The information mined from the analysis includes the challenges, method use and major contribution that can be applicable for future research in ML. The form of information that derives is in the way of motivation, methodology and result discussed.

**Results and Discussion**

In our study we reviewed papers that majorly focused on the ML based solution. In this study we found that those problems are not completely solved by traditional approaches such as list based approach, Heuristic approach etc. are easily solved by the ML Classifiers such as Naïve Bayes, Logistic Regression, Support Vector Machine, K-Nearest Neighbour, Decision Tree and Random Forest. To solve a real-world problem using ML have common approach or procedure which is known as ML Life Cycle. Which starts with Data Gathering and Pre-processing and ends with deployment of a ML Model.

Table-1: Summary of Real-World Problems Solved Using ML

Sr. No.	Author Name	Real-World Problem	Datasets Used	Techniques or Methodology	Accuracy in %
1.	Ramzi Farhat [1]	Analyzing learners data in e-learning platform	e-learning platforms, MOOCs Dataset	Logistic Regression Support Vector Machine Decision Tree Random Forest Naïve Bayes	97.8
2.	Malki Kothalawala [2]	Sentiment analysis for Hair care products review	Consumer Reviews Extracted From eBay Product Pages	Support Vector Machine (SVM) Aspect-based Sentiment Analysis	85
3.	Shovan Chowdhury [3]	Classifying Research Papers Abstract using ML's Classification Technique	Abstracts From Three Different Research Fields: Science, Business, and Social Science.	Support Vector Machines (SVM) Naïve Bayes K-Nearest Neighbour (KNN) Decision Tree	88.8

4.	Hui Qi Low [4]	Analyzing Women Harassment in Middle Eastern Literature with Sentiment Analysis	Sexual Harassment Corpus	Rocchio Classification, Boosting, Bagging, Logistic Regression, Naïve Bayes, K-Nearest Neighbour, Support Vector Machine Decision Tree, Random Forest	84.5
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5. Mohammed Jebbari [5]	Identifying Learning Styles in MOOC's	Xuetangx Platform, Which is the Largest MOOC Platform in China.	Decision Trees Neural Networks Naïve Bayes K-Nearest Neighbours Random Forests	99
6. Nita Patil [6]	Named Entity Recognition	FIRE-2010 Corpus	Named Entity Recognition using Conditional Random Fields CRFs	Precision = 82.33 Recall = 70.68 F1-Score = 75.51
7. Shankarappa Sridhara [7]	Multistage Sugarcane Yield Prediction	Whether Variable of Karnataka States	Random Forest, Support Vector Machine, Stepwise Multiple Linear Regression, Artificial Neural Network.	99
8. Saleh Nagi Alsubari [8]	Identification of Fake Reviews	1,600 Hotel Reviews Collected From the Popular Hotel Booking Website Trip Advisor.	Naïve Bayes (NB), Support Vector Machine (SVM), Random Forest (RF), and Adaptive Boosting (AB).	95

9. Mian Muhammad Danyal [9]	Sentiment Analysis for Movie Reviews	IMDB Movie Review Dataset, Rotten Tomatoes Movie Reviews	Naïve Bayes, Multinomial NB, Bernoulli Naïve Bayes, Gaussian Naïve Bayes, Complement Naïve Bayes, Hyperparameter Tuning, Grid search	85.77
10. Andrew S. Xiao [10]	Spam Detection for YouTube Video Comments	YouTube Comments	Support Vector Machine (SVM), Random forest, Naïve Bayes, Logistic Regression, K-Nearest Neighbor, MuliLayer Perceptron, Decision Tree, Voting classifier	96.42
11. Aleksey Borodulin [11]	Forecasting Price Segment of Houses and Real-Estates	PDF File of Real Estate Price Segment Classification Dataset.	Decision Trees, Neural Networks, Kohonen Maps	93.06
12. Muhammad Adeel Abid [12]	SPAM Email Filtering	SPAM & HAM SMS dataset	Support Vector Classifier, Gradient Boosting Machine, Random Forest, Gaussian Naïve Bayes, and Logistics Regression	99

13. Cherry Ahmed [13]	Customer's Perception Prediction in Social Networks by Sentiment Analysis	Twitter Dataset provider (AmazonHelp)	Decision Trees, Bagging, Support Vector Machine with Sequential Minimal Optimization (SMO) , Logistic Regression, Naïve Byes, Artificial Neural Network, Bayes Net	75
14. Ishaani Priyadarshini [14]	Human Activity Recognition in Cyber-Physical Systems	Primary Dataset (Single Chest Mounted Accelerometer) Secondary Dataset (Smartphone Accelerometer and Gyroscope)	Random Forest (RF) Decision Trees (DT) K-Nearest Neighbours (KNN) Convolutional Neural Networks (CNN) Long Short Term Memory (LSTM) Gated Recurrent Units (GRU)	98
15. Rakibul Hassan [15]	Sentiment Analysis in Fake	Hotel Reviews Of Chicago, United Sates by	Logistic Regression	89.37

	Online Review Detection	Using Amazon Mechanical Turk (AMT) and from Websites Like TripAdvisor and Yelp.com	Support Vector Machine Naïve Bayes	
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16. V. Umarania [16]	Sentiment Analysis for Restaurant Reviews	Kaggle Restaurant Reviews	Multinomial Naive Bayes, Bernoulli Naive Bayes, Logistic Regression, Random Forest, Support Vector Classifier, K-Nearest Neighbor Decision Tree LSTM CNN	76.33
17. Krasnyanskiy M. N. [17]	Document Classification for Research and Educational Documents	3000 Documents Based on Scientific and Educational Institution	Polynomial Naive Bayes Bernoulli Naive Bayes K-Nearest Neighbours (K = 250) Decision Trees Logistic Regression Neural Network	93%
18. Kofi Immanuel Jones [18]	Analyzing and Prediction of Risk in Insurance Sector	Insurance Dataset with 100 Records	Adaboost, Naive Bayes K-nearest neighbour Decision Tree machine	66.3
19. Gollam Rabby [19]	Multi-Classification of COVID-19 Documents	LitCovid corpus is	Random Forest, Neural Network (BERT)	92
20. Amarjyoti Pathak [20]	Detection of Android Malware	1 Defence Droid's Permission Dataset 2 Android Permission Dataset	K-Nearest Neighbor, Naive-Bayes, Decision Tree, Random Forest	91.48
21. Zahra Heydari [21]	Estimation of Residential Water End-Use Identification	<a href="https://stillwell.cee.illinois.edu/d ata/">https://stillwell.cee.illinois.edu/d ata/</a>	Random Forest (RF) Support Vector Machines (SVM) Logistic Regression (LR) Neural Networks	90

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**ML Techniques**

The ML algorithms can majorly be categorized into four categories supervised ML, unsupervised ML, semi-supervised ML and reinforcement ML.

**Naïve Bayes**

The Naïve Bayes is supervised ML algorithm based on Bays theorem. It is simple to implement [41].

$$P(c|x) = \frac{P(x|c).P(c)}{p(x)} \text{ ----- (1)}$$

Where, P(x|c) is the posterior Probability

P(x|c) is the likelihood

P(c) is the class prior probability

P(x) is the predictor prior probability

**Support Vector Machine**

This is algorithm used in classification as well as regression. This algorithm used for finding best hyperplane which separates the data points belongs to different classes [42].

$$w \cdot x + b = 0 \text{ ----- (2)}$$

Where, ‘w’ is the weight vector, ‘x’ is the input feature vector, ‘b’ is bias term

**Logistic Regression**

This algorithm predicts the probability that given input belongs to a particular class or not using a sigmoid function [43].

$$f(x) = \frac{1}{1+e^{-x}} \text{ ----- (3)}$$

Where, f(x) is output between 0 and 1 x is input and e is the Euler’s constant

**Decision Tree**

This algorithm is used for both task classification as well as regression. This algorithm splits the dataset into small subsets based on the feature value which will form a tree like structure [44].

$$Entropy(s) = - \sum p_i \log_2(p_i) \text{ ----- (4)}$$

**Random Forest**

This algorithm works on number of decision trees which is an ensemble ML algorithm. [45]

$$\hat{y} = \frac{1}{T} \sum_{t=1}^T h_t(x) \text{ ----- (5)}$$

Where, T is the number of trees h<sub>t</sub> is the prediction of t<sup>th</sup> tree

**K-Nearest Neighbour**

It classifies the new data based on the similarity between new data and available data category which most like available categories. It works on Euclidean distance [46].

$$Euclidean \ distance \ between \ A \ and \ B = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \text{ -----(6)}$$

**Real World Use Cases Where ML Played a Major Role**

ML has covered a very wide range of application areas such as

**Cybersecurity**

In the cyber world ML has shown best results in solving cyber threats as fraud detection, email spam detection, phishing attacks, malware detection, intrusion detection and network traffic pattern analysis. Adopting ML organizations have improved their security infrastructure and responded the real attacks [47].

### **Healthcare**

ML also plays a vital role in healthcare sector by improving patient monitoring, disease diagnosis and treatment planning which provides the accurate and fast disease prediction. ML models assist medical professionals by analysing patient history, medical images and detection of Cancer, Diabetes like diseases and helps in analysing Heart conditions [48, 49].

### **Agriculture**

In modern era ML helps in detection of crop disease, analysing soil conditions, optimizing irrigation. The ML predictive models help the farmers to improve their yield [50, 51].

### **Finance**

Many financial institutions use ML models for analysing transaction patterns for suspicious activity happening in fraudulent behaviour. Also stock prediction and credit scoring are the areas where ML proven its power [50].

### **E-commerce**

ML is used in many e-commerce platforms to support in product recommendation system for user. Also, analysis of customers regarding their browsing histories, their preferences, purchasing behaviour all these kinds of works done with ML. This will help in advancement in business as well as helping in improving sales and profit [53].

### **Autonomous Systems**

Autonomous systems like self-driving car depend on ML algorithms for the detection of road signs and signals, breakers, surrounding vehicles which are majorly used in building of autonomous vehicles. In addition, ML algorithms are used for traffic tracking, route optimization for user ease [54].

### **Conclusion**

This paper has reviewed highlighted diverse application and methodology of ML and deep learning across the various domains. The key findings include the effective use of algorithms such as Random Forest, Logistic Regression, K-Nearest Neighbour, Naive Bayes, Support

Vector Machine, Decision Tree etc. In task ranging from sentiment analysis and predictive modelling to sentiment polarity detection and classification. The application areas ranges from e-Learning Platforms, Sentiment Analysis, Customer Reviews, Healthcare, Agriculture, Cyber Security, Fraud Detection, Ransom-Ware Detection, Stock Prediction etc.

Methodological studies focuses the significance of data collection, data preprocessing, feature engineering and model evaluation in achieving robust results. The techniques such as classification algorithms TF-IDF, Classification and Prediction algorithms, collaborative methods such as ensemble modelling are shown enhancement in the performance matrix such as accuracy, precision, recall, and F1 score. We identified the challenges such as dataset inefficiency or biasness in the data, algorithm scalability, and the need for improved model generation across the different languages and domains.

Future research directions underscore the potential for advancing ML techniques through deeper integration with incorporation of more sophisticated feature engineering approaches and exploration of hybrid ML and deep learning models (ensemble models). Overall, the reviewed literature presents a reach landscape of technologies and applications resting a foundation for continued upgrading and enrichment in the field of ML.

**References**

1. Farhat, R., Mourali, Y., Jemni, M., & Ezzedine, H. (2020, February). An overview of machine learning technologies and their use in e-learning. In 2020 International Multi-Conference on: "Organization of Knowledge and Advanced Technologies" (OCTA) (pp. 1-4). IEEE.
2. Kothalawala, M., & Thelijjagoda, S. (2020, September). Aspect-based sentiment analysis on hair care product reviews. In 2020 International Research Conference on Smart Computing and Systems Engineering (SCSE) (pp. 228-233). IEEE.
3. Chowdhury, S., & Schoen, M. P. (2020, October). Research paper classification using supervised machine learning techniques. In 2020 Intermountain Engineering, Technology and Computing (IETC) (pp. 1-6). IEEE.
4. Low, H. Q., Keikhosrokiani, P., & Pourya Asl, M. (2024). Decoding violence against women: analysing harassment in Middle Eastern literature with machine learning and sentiment analysis. *Humanities and Social Sciences Communications*, 11(1), 1-18.
5. Jebbari, M., Cherradi, B., Hamida, S., & Raihani, A. (2024). Identifying learning styles in MOOCs environment through machine learning predictive modeling. *Education and Information Technologies*, 1-38.
6. Patil, N., Patil, A., & Pawar, B. V. (2020). Named entity recognition using conditional random fields. *Procedia Computer Science*, 167, 1181-1188.
7. SRIDHARA, S., SOUMYA, B., & KASHYAP, G. R. (2024). Multistage sugarcane yield prediction using machine learning algorithms. *Journal of Agrometeorology*, 26(1), 37-44.
8. Alsubari, S. N., Deshmukh, S. N., Alqarni, A. A., Alsharif, N., Aldhyani, T. H., Alsaade, F. W., & Khalaf, O. I. (2022). Data analytics for the identification of fake reviews using supervised learning. *Computers, Materials & Continua*, 70(2), 3189-3204.
9. Danyal, M. M., Khan, S. S., Khan, M., Ullah, S., Ghaffar, M. B., & Khan, W. (2024). Sentiment analysis of movie reviews based on NB approaches using TF-IDF and count vectorizer. *Social Network Analysis and Mining*, 14(1), 1-15.
10. Xiao, A. S., & Liang, Q. (2024). Spam detection for Youtube video comments using machine learning approaches. *Machine Learning with Applications*, 16, 100550.
11. Borodulin, A., Gladkov, A., Gantimurov, A., Kukartsev, V., & Evsyukov, D. (2024). Using machine learning algorithms to solve data classification problems using multiattribute dataset. In *BIO Web of Conferences* (Vol. 84, p. 02001). EDP Sciences.
12. Abid, M. A., Ullah, S., Siddique, M. A., Mushtaq, M. F., Aljedaani, W., & Rustam, F. (2022). Spam SMS filtering based on text features and supervised machine learning techniques. *Multimedia Tools and Applications*, 81(28), 39853-39871.
13. Ahmed, C., ElKorany, A., & ElSayed, E. (2023). Prediction of customer's perception in social networks by integrating sentiment analysis and machine learning. *Journal of Intelligent Information Systems*, 60(3), 829-851.
14. Priyadarshini, I., Sharma, R., Bhatt, D., & Al-Numay, M. (2023). Human activity recognition in cyber-physical systems using optimized machine learning techniques. *Cluster Computing*, 26(4), 2199-2215.
15. Hassan, R., & Islam, M. R. (2021, February). Impact of sentiment analysis in fake online review detection. In 2021 International conference on information and communication technology for sustainable development (ICICT4SD) (pp. 21-24). IEEE.
16. Umarani, V., Julian, A., & Deepa, J. (2021). Sentiment analysis using various machine learning and deep learning Techniques. *Journal of the Nigerian Society of Physical Sciences*, 385-394.

17. Krasnyanskiy, M. N., Obukhov, A. D., & Solomatina, E. M. (2019, March). The algorithm of document classification of research and education institution using machine learning methods. In 2019 International Science and Technology Conference" EastConf" (pp. 1-6). IEEE.
18. Jones, K. I., & Sah, S. (2023). The Implementation of Machine Learning In The Insurance Industry With Big Data Analytics. *International Journal of Data Informatics and Intelligent Computing*, 2(2), 21-38.
19. Rabby, G., & Berka, P. (2023). Multi-class classification of COVID-19 documents using machine learning algorithms. *Journal of Intelligent Information Systems*, 60(2), 571-591.
20. Pathak, A., Barman, U., & Kumar, T. S. (2024). Machine learning approach to detect android malware using feature-selection based on feature importance score. *Journal of Engineering Research*.
21. Heydari, Z., & Stillwell, A. S. (2024). Comparative analysis of supervised classification algorithms for residential water end uses. *Water Resources Research*, 60(6), e2023WR036690.
22. Sarker, I. H. (2021). Machine learning: Algorithms, real-world applications and research directions. *SN computer science*, 2(3), 160.
23. Pandey, S. V., & Deorankar, A. V. (2019, February). A study of sentiment analysis task and it's challenges. In 2019 IEEE International Conference on Electrical, Computer and Communication Technologies (ICECCT) (pp. 1-5). IEEE.
24. Ersozlu, Z., Taheri, S., & Koch, I. (2024). A review of machine learning methods used for educational data. *Education and Information Technologies*, 1-21.
25. Sharma, N. A., Ali, A. S., & Kabir, M. A. (2024). A review of sentiment analysis: tasks, applications, and deep learning techniques. *International Journal of Data Science and Analytics*, 1-38.
26. Baratchi, M., Wang, C., Limmer, S., van Rijn, J. N., Hoos, H., Bäck, T., & Olhofer, M. (2024). Automated machine learning: past, present and future. *Artificial Intelligence Review*, 57(5), 1-88.
27. Côté, P. O., Nikanjam, A., Ahmed, N., Humeniuk, D., & Khomh, F. (2024). Data cleaning and machine learning: a systematic literature review. *Automated Software Engineering*, 31(2), 54.
28. Qiu, S. (2024). Improving Performance of Smart Education Systems by Integrating Machine Learning on Edge Devices and Cloud in Educational Institutions. *Journal of Grid Computing*, 22(1), 41.
29. Waghchaware, S., & Joshi, R. (2024). Machine learning and deep learning models for human activity recognition in security and surveillance: a review. *Knowledge and Information Systems*, 1-32.
30. Alyasiri, O. M., Cheah, Y. N., Zhang, H., Al-Janabi, O. M., & Abasi, A. K. (2024). Text classification based on optimization feature selection methods: a review and future directions. *Multimedia Tools and Applications*, 1-47.
31. Valencia, J., Pineda, G. G., Pineda, V. G., Valencia-Arias, A., Arcila-Diaz, J., & de la Puente, R. T. (2024). Using machine learning to predict artistic styles: an analysis of trends and the research agenda. *Artificial Intelligence Review*, 57(5), 118.
32. Tan, K. L., Lee, C. P., & Lim, K. M. (2023). A survey of sentiment analysis: Approaches, datasets, and future research. *Applied Sciences*, 13(7), 4550.
33. Ajorloo, S., Jamarani, A., Kashfi, M., Kashani, M. H., & Najafizadeh, A. (2024). A systematic review of machine learning methods in software testing. *Applied Soft Computing*, 111805.
34. Brackmann, C., Hütsch, M., & Wulfert, T. (2023). Identifying Application Areas for Machine Learning in the Retail Sector: A Literature Review and Interview Study. *SN computer science*, 4(5), 426.

35. Méndez, M., Merayo, M. G., & Núñez, M. (2023). Machine learning algorithms to forecast air quality: a survey. *Artificial Intelligence Review*, 56(9), 10031-10066.
36. Yao, J., Tran, S. N., Sawyer, S., & Garg, S. (2023). Machine learning for leaf disease classification: data, techniques and applications. *Artificial Intelligence Review*, 56(Suppl 3), 3571-3616.
37. Lopes, A. G., & Fonseca, L. (2023). Tools and Techniques for Opinion Mining. In *ISEUD Workshops*.
38. Agarwal, A. (2020, September). Sentiment analysis of financial news. In *2020 12th International Conference on Computational Intelligence and Communication Networks (CICN)* (pp. 312-315). IEEE.
39. Shelke, M. B., & Deshmukh, S. N. (2020). Recent advances in sentiment analysis of Indian languages. *International Journal of Future Generation Communication and Networking*, 13(4), 1656-1675.
40. Alsafy, B. M., Aydam, Z. M., & Mutlag, W. K. (2019). Multiclass classification methods: a review. *Int. J. of Advanced Engineering Technology and Innovative Science*, 5(3).
41. Vembandasamy, K., Sasipriya, R., & Deepa, E. (2015). Heart diseases detection using Naive Bayes algorithm. *International Journal of Innovative Science, Engineering & Technology*, 2(9), 441-444.
42. Mammone, A., Turchi, M., & Cristianini, N. (2009). Support vector machines. *Wiley Interdisciplinary Reviews: Computational Statistics*, 1(3), 283-289.
43. Bisong, E. (2019). Logistic regression. In *Building machine learning and deep learning models on google cloud platform: A comprehensive guide for beginners* (pp. 243-250). Berkeley, CA: Apress.
44. Lu, Y., Ye, T., & Zheng, J. (2022, August). Decision tree algorithm in machine learning. In *2022 IEEE International Conference on Advances in Electrical Engineering and Computer Applications (AEECA)* (pp. 1014-1017). IEEE.
45. Breiman, L. (2001). Random forests. *Machine learning*, 45(1), 5-32.
46. Cover, T., & Hart, P. (1967). Nearest neighbor pattern classification. *IEEE transactions on information theory*, 13(1), 21-27.
47. Machhindra, P. A., Vijay, B. N., Mahendra, B. S., Rahul, C. A., Anil, P. A., & Sunil, P. R. (2023, December). Enhancing cyber security through machine learning: A comprehensive analysis. In *2023 4th International Conference on Computation, Automation and Knowledge Management (ICCAKM)* (pp. 1-6). IEEE.
48. Bhatt, J., Jain, S., & Bhatia, D. D. (2025). Artificial intelligence in healthcare diagnosis: evidence-based recent advances and clinical implications.
49. Maji, P., Mondal, A. K., Mondal, H. K., & Mohanty, S. P. (2024). Easydiagnos: a framework for accurate feature selection for automatic diagnosis in smart healthcare. *arXiv preprint arXiv:2410.00366*.
50. Rai, N., Boyd, N. S., & Schumann, A. W. (2025). Advancing site-specific disease and pest management in precision agriculture: From reasoning-driven foundation models to adaptive, feedback-based learning. *arXiv preprint arXiv:2510.24650*.
51. Liakos, K. G., Busato, P., Moshou, D., Pearson, S., & Bochtis, D. (2018). Machine learning in agriculture: A review. *Sensors*, 18(8), 2674.
52. Ismail, M. M., & Haq, M. A. (2024). Enhancing enterprise financial fraud detection using machine learning. *Engineering, Technology & Applied Science Research*, 14(4), 1485414861.

53. Jain, N., & Hussain, A. (2024). A Hybrid Machine Learning Approach for Improving ECommerce Recommendation Systems Using Python. *International Journal of Scientific Research in Science and Technology*, 11(6), 1092-1105.
54. Xu, Q., Zhang, L., Liu, Y., & Li, Z. (2026). Enhancing Trust Management System for Connected Autonomous Vehicles Using Machine Learning Methods: A Survey. *IEEE Transactions on Intelligent Transportation Systems*.