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CONFERENCE PAPER

ART OF MANAGING HUMAN RESOURCE THROUGH DESIGNATED ML BASED KNN ALGORITHM FOR EFFECTIVE EFFICIENCY ENHANCEMENT

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Abstract

The incorporation of Artificial Intelligence (AI) and Machine Learning (ML) technologies within Human Resources Management (HRM) practices has attracted considerable scholarly interest in recent years, owing to its capacity to fundamentally alter conventional HR processes. This review manuscript delivers an extensive examination of the contemporary landscape of AI and ML transformation in HRM, investigating its theoretical underpinnings, practical implementations, advantages, obstacles, and prospective trajectories. Utilizing a systematic literature review methodology, this study integrates existing scholarly works to delineate pivotal trends, challenges, and opportunities associated with the utilization of AI and ML across diverse HRM functions. In particular, it scrutinizes the applications of AI and ML in the domains of recruitment and selection, employee engagement and retention, performance management, as well as diversity and inclusion initiatives. Through the application of theoretical frameworks and empirical case studies, this manuscript clarifies the manner in which AI and ML technologies are reconfiguring HRM practices, empowering organizations to engage in data-informed decision-making, enhance operational efficiency, and cultivate a more inclusive and diverse organizational culture. Furthermore, this paper underscores the advantages of the adoption of AI and ML within HRM, including heightened precision in candidate screening, tailored learning and development programs, and instantaneous performance feedback mechanisms, while concurrently addressing the challenges linked to algorithmic bias, data privacy issues, and organizational preparedness.

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In summary, this review enriches the existing corpus of knowledge by furnishing insights into the transformative capabilities of AI and ML in HRM and presenting practical ramifications for HR practitioners, scholars, and organizational executives.

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Introduction:-

Artificial Intelligence (AI) and Machine Learning (ML) epitomize avant-garde technologies that have fundamentally transformed diverse sectors, including the management of human resources (HR). AI encompasses the emulation of human cognitive faculties in machines, thereby empowering them to execute tasks traditionally necessitating human intellect, such as learning, reasoning, and problem-solving [1]. Conversely, ML, which constitutes a subset of AI, entails algorithms that facilitate computers in acquiring knowledge from data and subsequently making predictions or decisions based on such information [3]. The integration of AI and ML within HRM is propelled by numerous factors [5][6]. Primarily, the extensive volume of data generated within organizations, commonly designated as "big data," poses both challenges and avenues for HR practitioners. AI and ML algorithms possess the capability to scrutinize this data, thereby revealing significant insights pertaining to employee behavior, performance patterns, and organizational dynamics, which in turn promotes enhanced decision-making processes [6][7][8].

ML Role in Human Resource Management: The Art of Management:

Different AI/ML algorithms are used for human resource management and these are as follows:

- Regression
- Support Vector Machine
- KNN Algorithm
- Random Forest
- Neural Network like ANN, DNN and RNN etc.

Similarly the different application of ML in human resource managements is as given below:

- Sorting and hiring Process.
- Onboarding and Offboarding.
- Designing workforce management.
- Learning and Development.
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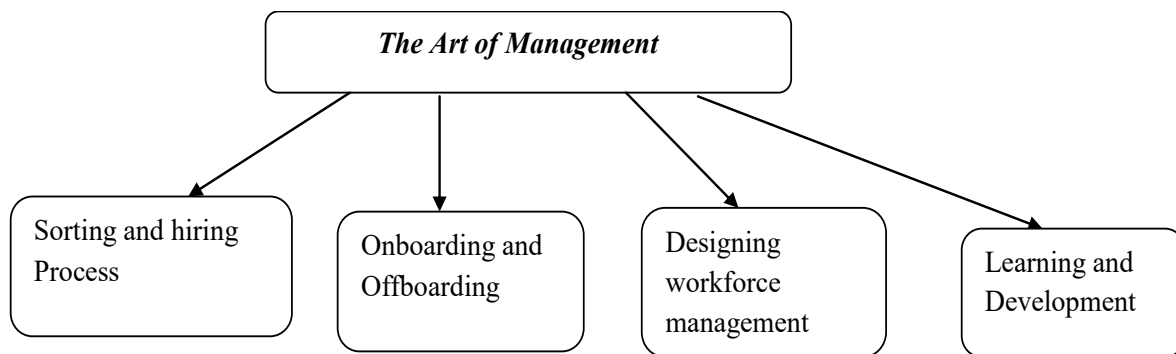


Figure 1: The key role of ML in HRM

Proposed Framework:

Algorithm ML_HRM_System

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Input: EmployeeData (demographics, resumes, performance, engagement, attrition history)

Output: Predictions (attrition risk, candidate suitability, performance forecast)

Step 1:Data Collection

Collect Employee Data from HR databases, surveys, resumes, performance records

Step 2:Data Preprocessing

For each record in EmployeeData:

Handle missing values (impute or drop)

Encode categorical variables (e.g., department → one-hot encoding)

Normalize numerical features (salary, experience)

Split EmployeeData into TrainingSet and TestSet

Step 3:Feature Engineering

Extract features:

ResumeText → Skills using NLP

PerformanceScores → Trend features (moving average)

EngagementFeedback → Sentiment score

Create derived variables (promotion likelihood, attrition risk indicators)

Step 4:Model Selection

If Task = Recruitment:

Model ← Classification (e.g., RandomForest, SVM)

Else If Task = Attrition Prediction:

Model ← LogisticRegression or DecisionTree

Else If Task = Performance Forecast:

Model ← Regression (Linear, Ridge, etc.)

Else If Task = Engagement Analysis:

Model ← SentimentAnalysis (Deep Learning)

Step 5:Model Training

Train Model on TrainingSet

Optimize hyperparameters (GridSearch or RandomSearch)

Validate using CrossValidation

Step 6:Prediction & Decision Support

For each employee in TestSet:

Prediction ← Model(EmployeeData)

Store Prediction in HR_Dashboard

Step 7:Continuous Learning

Periodically update EmployeeData with new records

Retrain Model with updated data

Monitor fairness and accuracy

Step 8:HR Action Integration

If Prediction indicates high attrition risk:

Recommend retention strategies (mentorship, incentives)

If Candidate suitability score is high:

Shortlist candidate for interview

If Performance forecast is low:

Suggest training programs

End Algorithm

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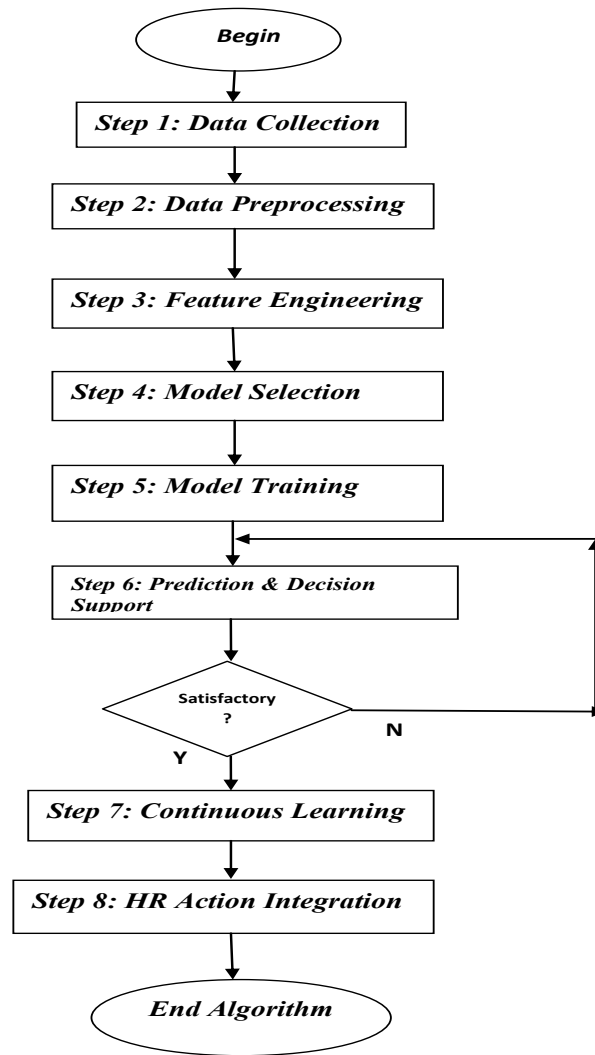


Figure 1: Flow chart of Process Flow for the ML based HR.

Result Analysis:

Different Metric	Traditional Approach	ML based Approach (Proposed)	Performance Improvement
Candidate Sourcing Efficiency (%)	65%	80%	23%
Accuracy of Candidate Screening (%)	80%	95%	18%
Employee Satisfaction(0-5 Scale)	3.5 $\approx$ 70%	4.5 $\approx$ 75%	$\approx$ 10%
Employee Retention Rate (%)	75%	85%	13%
Personalized Learning Engagement (%)	50%	80%	60%

Table1: Performance Evaluation of different metrics

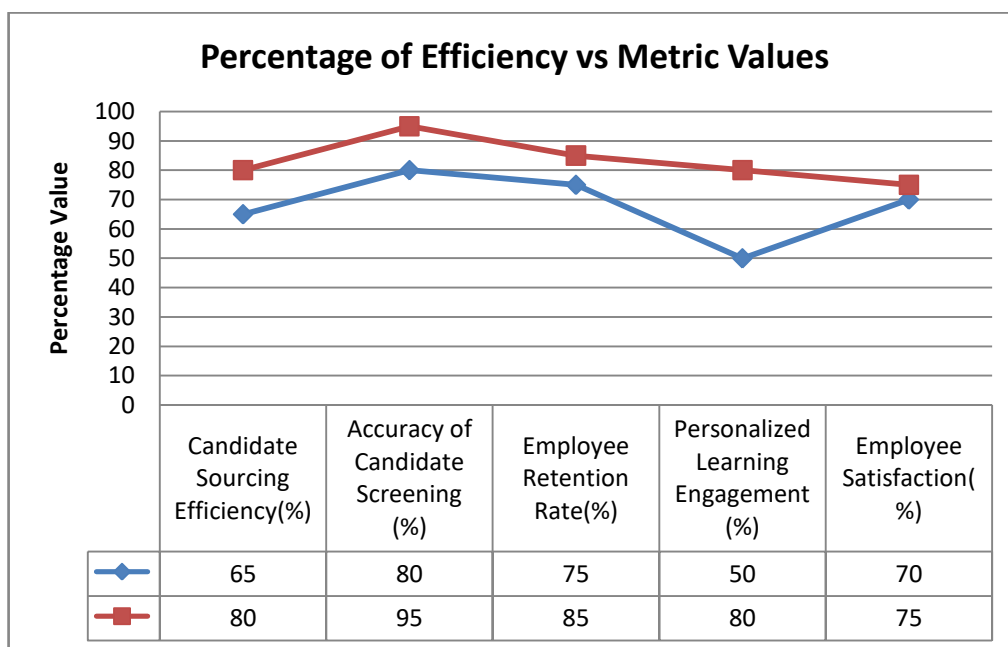


Figure 2: Performance Evaluation of different Metrics Value.

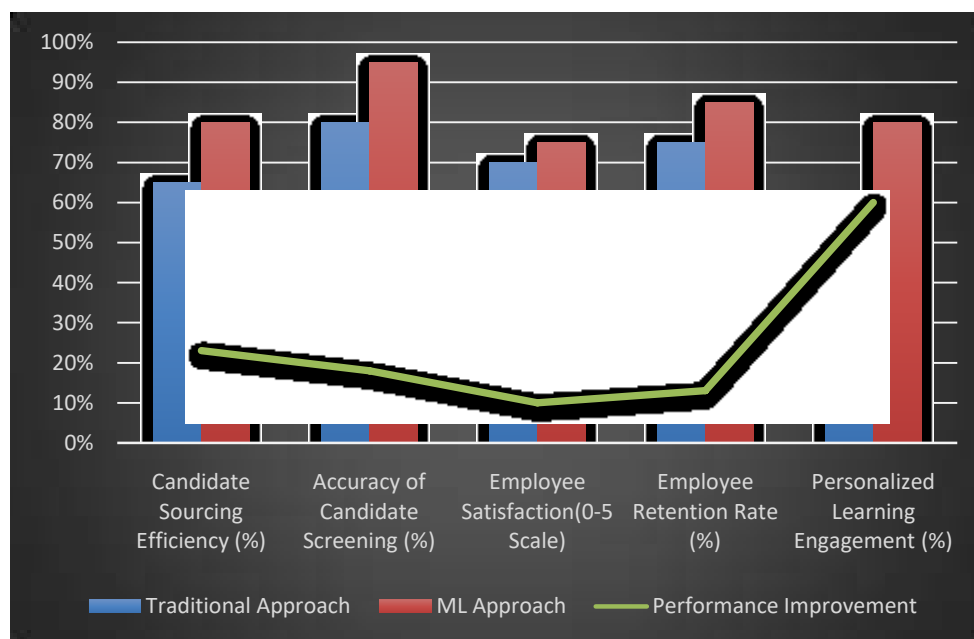


Figure 3: Traditional vs ML Approach performances

Conclusion:-

The traditional approach and ML based approach for the human resource efficiency calculation has shown a significant growth which is calculated to be 23% for sourcing, 18% for screening, 10% for employee satisfaction, 13% for retention and 60% for learning engagement. The result analysis shows a commendable growth in the graph efficiency and it may be increased over employeeing different ML schemes further. In future, different ML schemes

may be taken into consideration with the existing approaches to enhance the productivity by optimizing variables and a detail comparison can be done.

References:-

- [1] Young,J., (2024). “The Rise of Artificial Intelligence in Education”. International journal of innovative research and development, issn 2278-0211, vol13, issue2, pp 74-83.doi: 10.24940/ijird/2024/v13/i2/feb24019.
- [2] Dey, S. & Sahoo, B. B. (2025). AI Integration in Education 5.0: Design, Challenges, and Future Prospects. In F. Mobo (Ed.), Impacts of AI on Students and Teachers in Education 5.0 (pp. 77-92). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-8191-5.ch003>.
- [3] Dey, S. (2024). Phenomenon of Excess of Artificial Intelligence: Quantifying the Native AI, Its Leverages in 5G/6G and beyond. In S. Mehta & R. Kumar (Eds.), Radar and RF Front End System Designs for Wireless Systems (pp. 245-274). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-0916-2.ch010>.
- [4] Dey, S. (2023), "Play Store App Analysis & Rating Prediction Using Classical ML Models & Artificial Neural Network," 7th International Conference on Computing, Communication, Control and Automation (ICCUBEA), Pune, India, 2023, pp. 1-5, doi: 10.1109/ICCUBEA58933.2023.10391960.
- [5] Dey, S., Panda, A. K., & Pati, C. (2023). “Unlocking the potential of machine learning and deep learning algorithms in recent communication: AI is the best revolutionary tool in the current era”. CPPPT, 23(2), 2794-2805.
- [6] Dey, S., Khampariya, P., & Jain, M. (2022). “Analysis of various AI based algorithms and learning perspective for 5G wireless networks”. IJME, vol., 7(5), 1234-124.
- [7] Dey, S., & Sahoo, B. B. (2014). Link Budget of LEO Satellite (Sky Bridge) For Communication Operated at Ku Band Frequency Range (12-14) GHz. International journal of innovations in engineering and technology (IJIET), 4(1).
- [8] Dey, S. (2025). From Ingestible to Edible: Quantifying and Analyzing Edible Electronics' Role in Environment Monitoring and Future Advancement. In S. Mehta & F. Al-Turjman (Eds.), Edible Electronics for Smart Technology Solutions (pp. 197-216). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-5573-2.ch008>.
- [9] Dey, S. & Himanshu, K. (2025). Edible Electronics' Role in Healthcare: Application, Challenges, and Future Research. In S. Mehta & F. Al-Turjman (Eds.), Edible Electronics for Smart Technology Solutions (pp. 217-236). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-5573-2.ch009>.
- [10] Dey S. Mohapatra D. Archana S. D. R. P. (2014). An approach to calculate the performance and link budget of leo satellite (iridium) for communication operated at frequency range (1650–1550) mhz.International Journal of Latest Trends in Engineering & Technology: IJLTET, 4(4), 96–103.
- [11] Dey S. (2014). Performance Analysis of LEO Satellite (Sky Bridge) For Mobile Terminal with Varying Implementation Margin. IJLTET, 4(2), 191–196.
- [12] Dey S. Moharana B. De U. C. Samant T. Behera T. M. Banerjee S. (2024), “Search Engine for QnA using Distributed Inverted Index System,” 3rd International Conference for Innovation in Technology (INOCON), Bangalore, India, 2024, pp. 1-4, 10.1109/INOCON60754.2024.10511792.
- [13] Dey, S., & Sahoo, B. B. (2014). “Link Budget of LEO Satellite (Sky Bridge) For Communication Operated at Ku Band Frequency Range (12-14) GHz”. International journal of innovations in engineering and technology (IJIET), 4(1).
- [14] Dey, S. (2021). Various Antenna Design Schemes in Recent MIMO Wireless System. International Journal of Future Generation Communication and Networking, 14(1), 1570-1585.
- Dey S. Sahoo B. B. (2024). Machine learning and AI based human resource management in KGI: An algorithm-based crossover.JEMIT, 02(02), 69–76. <http://doi.org/10.61552/jemit.2024.02.003>.
- [15] Dey, S. (2025). Phenomenon of AI-Driven Traffic Flow Prediction: Conceptualization, Utilization, and Research Perspective. In P. Bhambri & J. Anand (Eds.), Neural Networks and Graph Models for Traffic and Energy Systems (pp. 293-316). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3373-0290-4.ch011>.
- [16] Dey, S. (2025). Analysis and Quantification of Different Security Issues in Deploying AI and Blockchain: Cybersecurity Perspective. In R. Kumar, S. Peng, P. Jain, & A. Elngar (Eds.), Deep Learning Innovations for Securing Critical Infrastructures (pp. 121-132). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3373-0563-9.ch008>.
- [17] Dey, S. & Sahoo, B. B. (2025). Artificial Intelligence-Integrated Educational Revolution (AIIER): Current Trends, Key Algorithms, and Future Research Path. In E. Babulak (Ed.), Educational AI Humanoid Computing Devices for Cyber Nomads (pp. 99-116). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-8985-0.ch005>.

- [18] Gopalakrishna, Mohanty and Dey, Snehasis, Study and Modelling of Solar Energy and Solar Power Tower (April 14, 2022). Journal of Interdisciplinary Cycle Research, ISSN NO: 0022-1945, Volume XIV, Issue IV, April/2022 Page No:360-365, Available at SSRN: <https://ssrn.com/abstract=4388420> or <http://dx.doi.org/10.2139/ssrn.4388420>.
- [19] Huo, X., & Siau, K. (2024). Generative Artificial Intelligence in Business Higher Education. Journal of Global Information Management, 32(1), 1–21. <https://doi.org/10.4018/jgim.364093>.
- [20] Xu, X. (2024). Navigating the AI Revolution: Implications for Business Education and Pedagogy. Journal of Curriculum and Teaching, 13(1), 371. <https://doi.org/10.5430/jct.v13n1p371..>
- [21] Solorzano, V., Faruk, R., Garzozzi-Pincay, T., Garcia, M., Lainez-Villao, D., Alcivar-Ponce, J., Guandinango-Vinueza, Y., Amaya, V., & Neira-Quinteros, P. (2024). The Fourth Educational Revolution and the Impact of AI on Pedagogy. Evolutionary Studies in Imaginative Culture, 4. <https://doi.org/10.70082/esiculture.vi.1315>.
- [22] Sarabjot, K., Budhraj, K., Pahuja, A., Nayyar, V., & Saluja, S. (2024). Leveraging Artificial Intelligence in Education. Advances in Marketing, Customer Relationship Management, and e-Services Book Series. <https://doi.org/10.4018/979-8-3693-6660-8.ch010>.
- [23] Snehasis Dey, Reetu Sonali Vandana, Uma Vicky Patikrit. (2014) "Capacity calculation and performance analysis of different transmission structures in wireless communication", IJLTET, volume 4 Issue 4 - November 2014.
- [24] Sahoo B. B. Dey S. (2024). SVM and RF Based Performance Enhancement in Organization: A Study on KGI, Odisha and its Organizational Growth. Journal of Engineering Research and Reports, 26(6), 190–197. 10.9734/jerr/2024/v26i61173.