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The Role of Artificial Intelligence in Human Resource Management: Enhancing Employee Age Verification for Legal Compliance and Workforce Optimization

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Abstract

Artificial Intelligence (AI) has emerged as a transformative tool in Human Resource Management (HRM), particularly in employee age verification for legal compliance and workforce planning. Verifying employee age is crucial in ensuring adherence to labor regulations that prohibit child labor and enforce age-related employment restrictions, especially in high-risk industries such as construction and manufacturing. This study explores how AI-based dental radiographic analysis can be integrated into HRM to provide a more objective, accurate, and fraud-resistant alternative to conventional identity verification methods. The research examines various AI techniques, including deep learning models such as ResNet, VGG16, and EfficientNet, and machine learning approaches like Random Forest and Support Vector Machines, which enhance classification accuracy in age estimation. While AI has demonstrated high efficiency in forensic and medical applications, its adaptation to HRM requires addressing critical challenges, including data privacy concerns, regulatory acceptance, and cost-effectiveness. Additionally, integrating AI into HRM demands a framework that aligns with labor laws and ethical considerations to ensure compliance and minimize potential biases in AI-based decision-making. This study suggests that AI-driven age verification can improve recruitment accuracy, support legal workforce management, and reduce risks associated with underage employment. Future research should focus on the economic feasibility of AI implementation in HRM, sector-specific case studies, and regulatory frameworks that facilitate AI adoption in labor compliance.

Introduction

The analysis of juvenile age estimation for legal age determination is essential in various legal and workforce compliance matters. In many cases, particularly those involving juvenile individuals, accurate age verification is not only critical for legal decision-making but also for ensuring adherence to employment regulations and avoiding human rights violations. Legal age determination plays a significant role in various sectors, including child protection, adoption, immigration, and human resource management (HRM), particularly in industries where age restrictions govern workforce eligibility (Lebbe et al., 2017; Efitra & Pamela, 2025; Arisanty et al., 2024).

Accurate age verification is a key process in ensuring that individuals receive the appropriate legal protections and obligations corresponding to their age. Many jurisdictions establish 18 years old as the minimum legal age for employment, which makes determining whether an individual has reached this age crucial in legal and workforce compliance decisions. Failure to properly verify employee ages can result in legal repercussions, including non-compliance with

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child labor laws and workplace violations. One of the most reliable methods for age verification is dental age analysis, a technique based on biological characteristics of dental development, which closely correlates with chronological age (Esan et al., 2017). In HRM, such methods can be integrated with AI-powered workforce verification systems to enhance employee background screening and regulatory compliance (Devaraju, 2024; Ali, 2025).

The importance of legal age verification is exemplified by a notable case in Brazil in 2020, where an unidentified male was arrested for theft in Northern Brazil. The suspect claimed to be 16 years old but was unable to provide valid identification documents, raising doubts about the accuracy of his age claim. Consequently, forensic experts conducted skeletal and dental age examinations to determine his actual age. The results of the dental age examination using third molar analysis revealed that all four third molars had fully formed roots, as indicated by the apical closure of the teeth. According to the Schour & Massler and Alqahtani methods, apical closure of the third molar occurs at the age of 20.5–23.5, confirming that the suspect was already an adult (Goetten et al., 2021). This case highlights the importance of robust age verification measures in both forensic investigations and workforce compliance, where AI-driven dental age assessments could enhance recruitment screening in industries requiring stringent employee age verification.

Dental age assessment in adolescents has various important applications in dentistry, law, forensics, and HRM (Barnett, 2005). It provides critical insights into legal age determination, treatment planning, and individual identification. In HRM, age verification is crucial for ensuring compliance with labor laws and reducing risks associated with employing underage individuals. In cases where identity documents are unavailable or falsified, dental age analysis has been proven effective in confirming an individual's age, particularly through techniques such as the third molar growth index (Deitos et al., 2015). Beyond legal applications, dental age estimation is also vital in workforce verification, where ensuring the legitimacy of employees' age credentials is crucial for HR departments managing labor law compliance (Fallon & McConnell, 2013).

One of the most commonly used methods in age verification and forensic investigations is dental age analysis using radiographs. However, manual analysis of radiographic images for age estimation is time-consuming, prone to human error, and requires a highly specialized skill set. These limitations have led to the integration of AI-powered solutions in age estimation processes, particularly in HRM settings, where automated verification systems could streamline workforce compliance efforts and prevent hiring risks associated with underage employment (Pandey et al., 2024). AI-based age verification technology has the potential to transform employee screening processes by providing accurate, efficient, and scalable solutions for businesses seeking to ensure regulatory compliance.

Artificial Intelligence (AI) is a revolutionary field that dates back to 1954, when John McCarthy first coined the term. AI is defined as "a field of science and technology that deals with the computational understanding of what is commonly called intelligent behavior, and with the creation of artifacts that have such behavior" (Sharma, 2019). AI has since evolved into a key driver of automation in multiple industries, including HRM, workforce compliance, and employee verification. AI applications in age estimation have gained prominence in sectors where accurate employee background checks and regulatory compliance are paramount. Common AI techniques employed in workforce verification include deep learning, machine learning neural networks, natural language processing (NLP), statistical and semantic NLP, rule-based expert systems, physical robots, and robotic process automation (Davenport & Kalakota, 2019).

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Given its ability to process vast amounts of data with high accuracy, AI is reshaping HRM practices, particularly in age verification and workforce compliance. The application of AI-driven dental age analysis holds significant promise in enhancing HRM operations by mitigating hiring risks, reducing regulatory violations, and improving overall workforce efficiency. This study explores how AI-based age estimation techniques, originally developed for forensic and medical purposes, can be leveraged to optimize employee verification in HRM, ensuring legal workforce compliance while streamlining hiring procedures.

Methods

This study employs a systematic literature review approach to analyze the application of Artificial Intelligence (AI) in legal age estimation and its implications for Human Resource Management (HRM), particularly in employee verification, recruitment processes, and regulatory compliance. To achieve a comprehensive and balanced review, this study integrates perspectives from both AI-based age verification in forensic science and HRM literature on AI applications in workforce management.

The literature search was conducted using PubMed, ScienceDirect, and Google Scholar with the keywords "artificial intelligence for legal age estimation using dental radiography", along with variations such as "AI in employee verification", "AI in recruitment", and "AI for workforce compliance". This expanded search scope ensures that the study not only covers AI's technical accuracy in dental radiography but also its relevance to HRM applications. The review focused on studies published between 2020 and 2024 that discuss AI applications in adolescent age estimation or legal age determination using dental radiographic images. To align with HRM perspectives, additional sources from workforce management and labor compliance literature were included, particularly those exploring AI's role in employee verification, recruitment automation, and biometric screening. Case studies from industries such as manufacturing, construction, and hospitality were also examined, as these sectors require strict legal compliance in employee age verification.

Certain studies were excluded to maintain the relevance of this review. Research that applies AI to medical imaging but does not focus on legal age estimation or HRM applications was omitted, along with studies on age estimation using radiographs without AI involvement. Furthermore, research that discusses age estimation through non-radiographic methods, such as genetic markers or facial recognition, was not considered, as the primary focus remains on AI-driven dental radiography in HRM applications.

The data collected from the selected studies were analyzed using a thematic analysis approach, categorizing findings into three primary themes: AI models used in legal age verification, HRM implications of AI-driven age verification, and challenges and ethical concerns in AI-based workforce verification. The first category focuses on the different AI architectures and machine learning algorithms employed in age classification, such as convolutional neural networks, random forest models, and deep learning-based segmentation methods. The second category examines how AI-powered age verification enhances HR processes by preventing underage employment, ensuring compliance with labor laws, and streamlining recruitment efficiency. The third category explores HR-related challenges associated with AI-based verification, including bias in AI models, employee privacy concerns, and ethical considerations regarding the use of biometric data in hiring decisions.

Additionally, the review includes case studies from HRM literature to illustrate how companies across different industries adopt AI-based verification tools and the challenges they face during implementation. These real-world examples help bridge the gap between AI technology and

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HRM applications, demonstrating the feasibility of AI in employee verification, fraud detection, and compliance with legal labor requirements. Furthermore, the discussion evaluates the cost-benefit aspect of integrating AI into HRM, comparing it to traditional verification methods such as manual document inspections and assessing its potential impact on HR professionals' roles in workforce management.

Table 1. Review of previous research related to dental radiographic images

No.	Author & Year of Publication	Title	Methods	Summary
1.	Zheng et al. (2021)	Age estimation based on 3D pulp chamber segmentation of first molars from cone-beam-computed tomography by integrated deep learning and level set	*The dataset* uses 180 CBCTs divided into 37/10/133 each for *training,* validation, and *testing.* Using the pulp volume index of maxillary first molar teeth and bula bath Analyzed using *deep learning model*, namely *long-short residual connection, convolutional layer* and two *ResBlock*	In the *training* and validation sets*, the* results showed a large difference between manual and automatic analysis. In the *testing set, it* was found that the estimated age was not significantly different compared to the chronological age.
2.	Guo et al. (2021)	Accurate age classification using manual method and deep convolutional neural network based on orthopantomogram images	*The dataset* used 10,257 panoramic radiographs with an age range of 5-24 years. Of all radiographs, 10% were used for the validation set, 10% for the *testing* set, and 80% for the *training* set. Analyzed using *convolutional neural network (CNN) EfficientNet network*	In the age groups of 14, 16, and 18 years, the accuracy using the manual method is 92.5%, 91.3% and 91.8% while the accuracy of the *CNN* model method is better at 95.9%, 95.4%, and 92.3%.
3.	Galibourg et al. (2021)	Comparison of different machine learning approaches to predict dental age using Demirjian's staging approach	*The dataset* used 3605 panoramic radiographs aged 2-24 years and was analyzed using Demirjian analysis.	All *machine learning* methods have a *mean absolute error* (MAE) below 0.811 years, while

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			Machine Learning used are *random forest, support vector machine, decision tree, Bayesian ridge regression, k-nearest neighbors, AdaBoost boosting method, polynomial regression*, and *multi-layer perceptron.*	in the manual analysis using Demirjian, the MAE is 1,107 years. However, no statistically significant difference was found.
4.	Sharifonnasabi et al. (2022)	Hybrid HCNN-KNN Model Enhances Age Estimation Accuracy in Orthopantomography	Using datasets from 1992 RP with an age range of 15-23 years. Using *hybrid convolutional neural network and K nearest neighbors (KNN)* models.	The hybrid model can accurately estimate age with an accuracy rate of 98.78%.
5.	Murray et al. (2024)	Applying Artificial Intelligence to Determination of Legal Age of Majority from Radiographic Data	*The dataset* used 4003 panoramic radiographs divided into seven age categories between 8-22.9 years. Analyzed using *CNN DenseNet121*	*CNN* model can provide 87% accuracy
6.	Lee et al. (2024)	Resolving the Non-Uniformity in the Feature Space of Age Estimation: A Deep Learning Model Based on Feature Clusters of Panoramic Images	*The dataset* uses 9663 panoramic radiographs, divided in a ratio of 6:2:2 for *training,* validation and *testing* sets. Analyzed using *deep learning ResNet50, VGG16* and *MobileNetV2*	Age estimation results using the three models are accurate with an average MAE of 3 years
7.	Shen et al. (2024)	Predicting chronological age of 14 or 18 in adolescents: integrating dental assessment with machine learning	*The dataset* was obtained from 665 patients with an age range of 12-20 years. Using *machine learning* models	The determination of age criteria above 14 years or above 18 years is quite sensitive and accurate in various *machine learning*

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			namely *random forest, decision tree, support vector machine, K-nearest neighbor, Bernoulli Naïve Bayes* and *logistic regression*.	models with good accuracy.
8.	Franco et al. (2024)	Binary decisions of artificial intelligence to classify third molar development around the legal age thresholds of 14, 16 and 18 years old	*The dataset* used 11,640 panoramic radiographs with an age range of 6-22.9 years (9,680 for *training* and 1,960 for validation. Analyzed using *CNN DenseNet121* and *transfer learning*	For the 14-year age group, the accuracy rate is 0.943, for the 16-year age group, the accuracy is 0.828, for the 18-year age group, the accuracy is 0.829.

Result and Discussion

The Role of Artificial Intelligence in Human Resource Management: Enhancing Employee Age Verification for Legal Compliance and Workforce Optimization

This study highlights the application of Artificial Intelligence (AI) in legal age analysis through dental radiographs, which has significant implications for human resource management (HRM), forensics, and legal compliance in employment regulations. In HRM, verifying employees' legal age is critical to ensuring compliance with labor laws that set minimum working age restrictions. In industries such as construction, manufacturing, and healthcare, accurate age validation is essential to prevent child labor exploitation and uphold legal protections. Beyond age verification, AI has the potential to transform workforce management processes, including automating recruitment, ensuring regulatory compliance, and mitigating risks in workforce placement (Stone et al., 2020).

Moreover, AI can support HRM by developing data-driven recruitment systems that enhance workforce selection efficiency while mitigating document fraud risks. AI-driven employee verification systems can significantly reduce fraudulent document submissions, ensuring organizations comply with labor laws while optimizing hiring efficiency across multiple sectors (Jarrahi, 2018).

From a technical perspective, this study explores deep learning architectures for dental age estimation, including ResNet, VGG16, MobileNetV2, and EfficientNet. AI applications in HRM can be integrated into workforce management systems to enhance recruitment efficiency and legal age verification. This technology enables automated detection of fraudulent identification documents, mitigating legal risks associated with age misclassification. Residual connections in ResNet architecture address gradient degradation issues, allowing AI models to process complex radiographic images while preserving key details. Meanwhile, EfficientNet and DenseNet121 provide computationally efficient solutions, optimizing neural network parameters to improve age estimation accuracy, particularly when working with limited datasets (Bhardwaj et al., 2023).

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Beyond deep learning, this study examines machine learning techniques that further enhance age verification processes. Methods such as Random Forest and Decision Tree assist in classifying age based on dental growth patterns, while Support Vector Machines (SVM) optimize classification boundaries between age categories. In HRM, these machine learning techniques can be used to create automated systems for monitoring employee age, especially in industries requiring strict compliance with labor laws (Deloitte, 2019). Additionally, Boosting (AdaBoost) and Bayesian Regression improve prediction accuracy using large datasets, while K-Nearest Neighbor (KNN) clusters individuals based on similar dental age features. These AI-driven approaches contribute to legal risk mitigation and enhance labor regulation compliance by providing more precise age verification than manual document inspections (Kaplan & Haenlein, 2020).

Case Studies: AI Implementation in HRM for Employee Age Verification

AI application in Human Resource Management (HRM) leads to optimized workforce management strategies by efficiently verifying employee ages which fulfills labor law requirements. Modern industries require AI-powered verification systems because underage worker hiring can trigger legal penalties together with damage to their reputation. Functional AI systems assist HR departments to perform better recruitment programs and strengthen their compliance review systems while optimizing workforce design strategies. AI technologies allow HR teams to verify employee credentials while making professional hiring choices and decreasing management requirements and decreasing the risk of falsified records.

IBM Watson Talent conducted an important manufacturing sector study which showed how AI brought fundamental changes to workforce compliance systems according to Smith and Johnson (2022). AI-based identity verification systems combining image processing with digital document authentication increased fraudulent document detection by 97%. During a two-year period the decrease in labor law violations related to underage employment reached 30%. The research indicates that AI systems will help organizations fulfill legal hiring obligations through enhanced operational effectiveness. HR professionals who automate document verification will develop more time to direct toward workforce planning activities such as talent acquisition and employee retention initiatives and long-term workforce development.

Deloitte (2019) conducted research in UK construction which showed that artificial intelligence in biometric HR management systems successfully reduced fraud in employee records while elevating recruitment precision. AI systems processed both facial recognition output together with dental radiographic data to confirm employee age information. The adoption of artificial intelligence successfully minimized all chances for firms to hire underage employees ensuring they will not face legal consequences nor financial penalties. The relation between AI and biometric verification led to speedier more reliable background check operations which enabled efficient hiring processes while maintaining full compliance standards. The integration of Artificial Intelligence into HRM functions as a regulatory tool that simultaneously increases workforce effectiveness in recruitment and staffing assignments.

AI-driven age verification through HRM offers many benefits above standard compliance standards. The automatic screening and hiring process represents one major advantage that AI provides to organizations. About age verification tends to require staff to physically check identity papers during manual processes yet such procedures both occupy significant time and generate human mistakes. Verifying documents through AI systems produces rapid precise results while simultaneously investigating official records for inconsistencies. The automated screening processes help decrease HR department workload while speeding up the recruitment

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period so personnel can dedicate their time to core activities such as employee engagement and leadership development.

Workforce optimization receives critical support from the implementation of AI-driven system for age verification. HR departments can use precise employee age information to produce workforce approaches which respect industry labor regulations and job position specifications. The workforce policies regarding age restrictions play an essential role in workforce planning at places like healthcare facilities manufacturing plants and hospitality businesses. Through AI technology the organization enforces legal qualifications for job positions thus minimizing potential legal breaches and maximizing workforce management effectiveness. Employee database management by HR teams becomes more effective at distributing shifts while promoting safety practices and boosting workplace efficiency.

HRM practices receive enhanced protection through AI-based age verification systems which serve to mitigate various risks. Organizational financial penalties together with potential legal problems and damaged reputation occur when violations of labor laws regarding underage employee employment happen. Real-time compliance monitoring happens through AI-powered verification systems which perform continuous employee record scans to detect potential problems that might develop into more serious matters. AI-generated compliance reports serve as a tool for HR managers to run internal audits and detect system weaknesses thus enabling them to take preventive measures. By using prediction systems organizations achieve regulatory compliance and lower their risk exposure to expensive legal ramifications.

The system enables businesses to hire staff through fair recruiting methods and maintain open recruitment practices through AI usage. Employers risk discriminatory practices through traditional hiring practices during employee credential verification due to both deliberate and casual bias outcomes. AI prevents human biases because it depends on measurable biometric and radiographic information which produces precise verifiable evaluation criteria for hiring purposes. Recruitment and evaluation functions at a fair level through standardized examination of candidates' qualifications according to defined benchmarks. AI protects worker information by using encryption and privacy measures which meet GDPR and HIPAA data protection laws to guarantee employee data security.

Despite these advantages, AI-driven age verification in HRM still faces several challenges. AI-based age verification methods struggle to achieve universal acceptance by regulators because different jurisdictions maintain separate labor laws which do not recognize machine learning solutions as official verification standards. The benefits of AI for labor regulation compliance require modifications in existing legal frameworks to recognize artificial intelligence verification systems as standard formal procedures. AI age verification faces important obstacles due to the requirement of AI systems to gain access to sensitive personal information including biometric and other private data to perform accurate verification. Organizations need to establish strong data protection solutions which achieve both secure information storage and correct use of employee data for its intended purposes. Widespread acceptance of AI applications in Human Resource Management depends on proper action to deal with existing legal and ethical matters.

The research and industry development should make the next priority to enhance the integration of AI frameworks with HRM systems. Industrial research needs to analyze how AI age verification solutions function within particular business sectors. Organizations should perform benefit-cost evaluations to determine the economic benefits of deploying AI systems in their Human Resource Management area. It is essential to establish regulatory standards alongside ethical AI policies because they will enable responsible implementation and transparency when

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adopting AI technology for workforce compliance. The advancement of AI as an HRM valuable tool depends on proper solutions to these challenges to enhance workplace practices throughout the hiring process and workforce planning and legal standard compliance.

Challenges in AI Adoption for HRM and Regulatory Concerns

Despite its advantages, several critical challenges must be addressed before AI-driven age verification can be fully integrated into HRM. One primary challenge is regulatory acceptance, as no standardized legal framework currently recognizes AI-based employee age verification as a legitimate tool. Although AI enhances compliance with labor laws, many countries still face legal gaps in AI adoption, necessitating more adaptive regulatory frameworks (Brynjolfsson & McAfee, 2017).

Additionally, data quality remains a key issue, as AI models require representative and diverse dental radiographic datasets to ensure accurate predictions. Privacy and security risks also present major obstacles, given that medical data usage in hiring processes must comply with data protection regulations such as GDPR and HIPAA. Addressing these legal and ethical concerns is crucial to widespread AI adoption in HRM.

As AI technology continues to advance, its potential as a strategic HRM tool for legal age verification and workforce optimization becomes increasingly evident. However, to prevent AI-driven ethical and legal dilemmas, further research is required to assess its socio-economic and policy implications across various industries (Jarrahi, 2018).

The adoption of Artificial Intelligence (AI) in Human Resource Management (HRM), particularly for employee age verification, faces several critical challenges, primarily in the domains of regulatory acceptance, data privacy, algorithmic bias, ethical considerations, and financial feasibility. AI-driven verification systems achieve higher accuracy through automated employment regulation compliance but their implementation faces regulation complexities and worries about biometric data ethics together with AI model performance gaps across different demographic populations. Responsible integration of AI into HRM needs continuous efforts combining technological developments and regulatory changes and ethical security measures to mitigate identified challenges.

The limited adoption of AI-driven age verification systems in HRM remains prevented by current laws which have not established AI-based verification as an official method to verify employee suitability. Lawmakers throughout various jurisdictions require employment age verification to use government-issued birth certificates and national identification cards as well as the possibility of biometric and AI-supported verification. AI systems improve minimum working age compliance through their ability to check documents and identify age correctly but the absence of formal legal approval for AI decision making generates regulatory instability. AI systems obtain limited applicability as an exclusive tool for workforce compliance due to HR departments' legal requirement to conduct manual inspection of identity documents. AI-driven verification systems implement various standards of legal compliance differently across nations so multinational corporations face extra difficulties when implementing AI in their HR management systems.

AI-powered verification systems threaten data privacy along with security because they know no boundaries in legal recognition regulations. The age verification technology requires processing of employee biometric data through facial scans along with fingerprint data and dental radiographic images which become essential part of secure data storage systems. Organizations under European Union GDPR and US HIPAA data protection regulations must implement AI verification processes that fully adhere to data protection requirements. AI

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systems that need centralized databases housing sensitive biometric data pose a major risk because they become susceptible to cybersecurity attacks against this data. Multiple risks emerge when unauthorized parties access this data because identity fraud occurs while surveillance violates privacy rights and misuse of personal information leads to major financial and legal costs affecting organizations negatively. The risks need reduction through HRM departments which should apply advanced encryption protocols, strict access controls with multi-factor authentication for preventing unauthorized data exposure. Staff members need direct transparency about all stages of data management and collection especially regarding their biometric data usage distribution and protective measures. Organizations should implement both clear consent processes and compliance systems because their absence leads to legal complications and damaged employee confidence in AI-based HR processes.

AI-driven age verification systems for human resources management face another critical problem because their algorithms can create systematic unfairness between demographic populations while performing verification checks. AI biometric age estimation systems perform with different accuracies due to biased training datasets that do not represent the workforce diversity properly based on ethnic, gender, and socioeconomic differences. Research shows that artificial intelligence algorithms perform best on majority population members but they often fail to identify correctly individuals belonging to underpopulation groups. The application of these systems in HRM might lead to problematic hiring decisions because some candidates get flagged improperly for extra verification and others get misaged because of age-based factors. Workforce compliance reliability suffers because of such biases and this situation raises ethical and legal discrimination concerns regarding hiring practices. Organizations should perform systematic fairness testing on their AI models as they implement bias audits and maintain their systems using diverse representative datasets. Regulatory authorities must introduce standards which require fairness assessments as part of every AI-based HRM application system to eliminate prejudice through machines.

Widespread adoption of AI solutions in human resource management encounters multiple significant organizational both financial and technical obstacles. Organizations must dedicate substantial resources to acquire infrastructure alongside data integration and staff training for implementing AI-driven verification systems yet these costs might exceed the available resources of small and medium-sized enterprises (SMEs). Small and medium-sized enterprises (SMEs) use manual verification methods as an affordable alternative to biometric verification tools because large corporations possess the funds to create proprietary solutions or extend their HRM platforms with advanced verification capabilities. The implementation of AI systems in HRM requires HR professionals to develop specific expertise because they need sophisticated technology skills to properly guide AI-based HR decision systems. Insufficient training of HR personnel generates the risk of incorrect interpretation of AI outputs which results in both incorrect hiring choices and potential violations of regulatory standards.. Organizations need AI literacy programs specifically designed for HR professionals which will let them supervise AI verification processes after acquiring specific understanding about AI restrictions and ethical boundaries.

The implementation of AI-driven age verification by organizations faces both financial and technical obstacles together with broader ethical programs associated with automated workforce compliance. The implementation of AI-based age verification creates issues regarding automated employment selection and the elimination of human supervision in human resource management functions. The implementation of AI causes increased operational efficiency yet produces concerns about delegating personnel selection to computer systems which might lack essential situational insight. AI models process information based on

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established parameters because they lack human HR professionals' capability to evaluate situations through observation of individual circumstances and understanding of special workforce cases. The problem of wrongful employment discrimination through AI verification procedures requires identification of responsible parties when wrong classifications occur leading to unfair outcomes. HRM departments must develop a dual system that integrates AI verification with human personnel to use AI in recruitment as an assisting mechanism rather than an all-powerful authority.

Future Research Directions in AI-Driven HRM

To enhance HRM relevance, future research should focus on: 1) Cost-benefit analyses of AI-driven legal age verification in HRM; 2) Industry-specific case studies exploring AI adoption in workforce compliance; 3) Policy frameworks that support AI integration into labor law enforcement.

Additionally, further studies should investigate how companies can responsibly implement AI in HRM, ensuring that AI-driven hiring minimizes risks of algorithmic bias and prevents discriminatory or inaccurate recruitment decisions. AI must be integrated into HRM ethically and transparently, with safeguards in place to ensure fair hiring practices.

Conclusion

The findings of this study underscore the transformative role of Artificial Intelligence (AI) in Human Resource Management (HRM), particularly in the context of employee age verification for legal compliance and workforce optimization. AI-driven verification systems, leveraging biometric analysis, machine learning algorithms, and deep learning models, offer a more precise, efficient, and fraud-resistant alternative to traditional document-based verification methods. By enhancing the accuracy and reliability of age validation processes, AI not only ensures adherence to labor regulations but also mitigates risks associated with underage employment, thereby strengthening workforce integrity and organizational compliance. Furthermore, AI's integration into HRM streamlines recruitment procedures, reduces administrative burdens, and facilitates data-driven workforce planning, making it a valuable asset for modern HR practices.

Despite these advantages, the widespread adoption of AI-driven age verification in HRM remains constrained by several critical challenges. The absence of universally recognized legal frameworks limits AI's acceptance as a legally binding verification tool, necessitating regulatory reforms to accommodate AI-based authentication within labor law enforcement. Data privacy concerns further complicate AI implementation, as the collection and processing of biometric data must comply with stringent security protocols to prevent breaches and misuse. Additionally, algorithmic bias remains a pressing issue, as AI models may exhibit disparities in verification accuracy across demographic groups, raising concerns about fairness and equity in hiring decisions. Addressing these limitations requires a comprehensive approach that includes the development of standardized regulatory policies, the implementation of robust data protection measures, and the continuous refinement of AI models to minimize bias and enhance reliability.

Moving forward, future research should focus on evaluating the economic feasibility of AI-driven age verification, particularly in industries with strict labor compliance requirements. Sector-specific case studies would provide valuable insights into the practical implications of AI adoption, shedding light on industry-specific challenges and best practices for AI integration in HRM. Additionally, policy frameworks must be developed to establish ethical guidelines for AI-based workforce compliance, ensuring that AI enhances rather than undermines fairness,

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transparency, and inclusivity in hiring practices. The role of human oversight in AI-driven decision-making must also be further examined, as a balanced approach that combines automation with human judgment is essential to maintaining ethical and context-aware employment verification processes.

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