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Artificial Intelligence in Forensic Odontology: Advancing Accuracy in Victim Identification and Crime Solving

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ABSTRACT

Background: Forensic odontology plays a pivotal role in human identification, particularly in criminal investigations and mass disaster scenarios. Traditionally, this field has relied on manual techniques, which are often limited by human error, subjectivity, and time constraints. Recent advances in artificial intelligence (AI) offer new solutions to overcome these challenges. **Objective:** This review aims to explore and synthesize the current knowledge regarding the integration of AI in forensic odontology, focusing on its role in victim identification, bite mark analysis, and age and sex estimation. **Method:** A narrative literature review was conducted using electronic databases, including PubMed, Scopus, Web of Science, and Google Scholar. Articles published between 2015 and 2023 were retrieved using relevant keywords such as "artificial intelligence," "forensic odontology," "victim identification," "bite mark analysis," and "age estimation." Inclusion criteria encompassed original research, systematic reviews, and high-quality narrative reviews in English discussing AI or machine learning applications in forensic dentistry. Exclusion criteria were non-English publications, unrelated studies, and papers lacking methodological clarity. **Results:** The integration of AI, particularly machine learning and neural networks, has significantly improved the accuracy and efficiency of forensic odontology procedures. AI systems demonstrate superior performance in dental image recognition, bite mark pattern analysis, and age/sex prediction compared to conventional methods. These tools facilitate rapid data processing and reduce examiner bias, making them especially valuable in time-sensitive situations like disaster victim identification. Furthermore, AI contributes to more reliable and consistent forensic evidence in legal settings. **Conclusion:** AI is revolutionizing forensic odontology by enhancing precision, objectivity, and speed in identification processes. Despite its advantages, ethical concerns regarding data privacy and the need for standardization remain critical. Continued interdisciplinary research and validation are essential to ensure the responsible and effective adoption of AI in forensic science.

Keywords: Forensic odontology, artificial intelligence, victim identification, criminal case, machine learning

1. Introduction

Forensic odontology has an important part in criminal investigations by providing vital techniques for victim identification and dental evidence analysis. Forensic odontology has historically depended on manual methods to offer significant insights in criminal cases, such as bite mark analysis and dental record comparison. Nevertheless, subjectivity and human error frequently constrain these approaches, which may affect the precision and dependability of the outcomes. The introduction of Artificial Intelligence (AI) and its incorporation into forensic science have revolutionized the study and use of forensic odontology.[1] AI technologies, particularly machine learning and deep learning algorithms, have demonstrated their potential to enhance the capabilities of forensic odontology.[2] These advancements allow for the processing of vast amounts of dental data with unprecedented speed and precision, surpassing the limitations of traditional methods. Machine learning algorithms can identify complex patterns in dental records and radiographs, improving the accuracy of victim identification and bite mark analysis. [2,3]

Recent studies have highlighted the applications of AI in various aspects of forensic odontology, including the analysis of dental images, the comparison of bite marks, and the estimation of age. AI-

powered tools are now able to perform automated analysis of dental x-rays and 3D scans, facilitating more accurate and efficient forensic evaluations. This technological integration not only improves diagnostic capabilities but also reduces the risk of human error, which is crucial in the high-stakes environment of forensic investigations.[1] The evolution of AI technologies has led to the development of advanced diagnostic tools that complement traditional forensic techniques. For example, AI-powered software can now assist in the analysis of bite mark patterns, which have historically been challenging to interpret. By leveraging AI, forensic odontologists can achieve more precise and objective results, thereby improving the overall effectiveness of forensic investigations. [4]

One of the key advantages of AI in forensic odontology is its ability to enhance the efficiency of victim identification, especially in cases involving mass disasters. AI algorithms can quickly analyze large datasets, including dental records from numerous individuals, to assist in identifying victims with greater accuracy and speed. This capability is particularly valuable in disaster scenarios where timely identification is critical.[1,5] Despite the promising benefits of AI in forensic odontology, there are also several challenges and considerations associated with its implementation. Ethical issues, such as data privacy and the potential for algorithmic bias, need to be addressed to ensure the responsible use of AI technologies in forensic practice.[6] Additionally, there is a need for ongoing validation of AI tools to maintain their reliability and accuracy in forensic applications. The evolution of AI technologies has led to the development of advanced diagnostic tools that complement traditional forensic techniques. For example, AI-powered software can now assist in the analysis of bite mark patterns, which have historically been challenging to interpret. By leveraging AI, forensic odontologists can achieve more precise and objective results, thereby improving the overall effectiveness of forensic investigations.[7]

AI also plays a role in enhancing the educational and training aspects of forensic odontology. AI-driven simulations and educational tools can provide practitioners with valuable experience and insights into the application of advanced technologies in forensic scenarios. This educational advancement is crucial for preparing the next generation of forensic odontologists to effectively utilize AI in their practice. The impact of AI on forensic odontology extends beyond the immediate practical applications to influence broader aspects of the field, including research and policy development. The use of AI can inform the development of new forensic standards and guidelines, as well as contribute to ongoing research in forensic science. By integrating AI into forensic odontology, researchers and policymakers can drive innovation and improve the overall quality of forensic practices. [8]

AI technologies are revolutionizing forensic odontology by enhancing diagnostic accuracy, efficiency, and overall effectiveness. As the field continues to evolve, ongoing research and development will be essential to fully realize the potential of AI and address the associated challenges.[1] This review will contribute to a deeper understanding of how AI is shaping the future of forensic odontology and its role in solving complex criminal cases

2. Conceptual Review

2.1. Overview of Forensic Odontology

Forensic odontology is a specialized field within forensic science that focuses on the application of dental knowledge to legal investigations, particularly in the identification of victims and analysis of dental evidence.[9] Traditionally, forensic odontology relies on techniques such as comparing dental records, analyzing bite marks, and evaluating dental patterns to assist in criminal investigations and disaster victim identification. These methods have proven invaluable in scenarios where other forms of identification are challenging or impossible.[7] However, traditional forensic odontology methods are not without limitations. The manual comparison of dental records can be time-consuming and prone to human error, while the analysis of bite marks is often subjective and can be affected by the variability in bite mark presentation and the condition of the evidence.[10] The field has recognized the need for technological advancements to enhance the accuracy and efficiency of these traditional methods. Recent developments in artificial intelligence (AI) offer promising solutions to address these limitations by providing automated, data-driven approaches to analyzing dental evidence, thereby improving the reliability and speed of forensic assessments.[2]

2.2. Artificial Intelligence in Forensic Odontology

Artificial Intelligence (AI) encompasses a range of technologies designed to simulate human intelligence through algorithms and machine learning. In the realm of forensic science, AI has emerged as a transformative force, offering advanced tools and methodologies that enhance the

accuracy and efficiency of investigative processes. AI technologies, such as machine learning and deep learning algorithms, have been increasingly integrated into various forensic applications, including forensic odontology. These technologies leverage large datasets to identify patterns and make predictions with high precision, which is crucial for tasks such as victim identification and evidence analysis. [11] Forensic odontology, traditionally reliant on manual and often subjective methods, benefits significantly from AI's ability to process complex data sets and perform detailed analyses. For example, machine learning algorithms can analyze dental radiographs and records to identify unique patterns and anomalies that may not be visible to the human eye.[12,13] Deep learning models, particularly convolutional neural networks (CNNs), are employed to improve image recognition and classification tasks, which are essential for accurate bite mark analysis and dental pattern comparison. The integration of AI into forensic odontology not only enhances diagnostic capabilities but also introduces new opportunities for improving the reliability and objectivity of forensic assessments, marking a significant advancement in the field.[14]

The integration of AI technologies and algorithms into forensic odontology has introduced innovative methods for analyzing dental evidence, significantly improving the field's accuracy and efficiency. One of the most prominent technologies used is machine learning, which involves training algorithms on large datasets to identify patterns and make data-driven predictions. For instance, supervised learning algorithms can be trained on annotated dental images to recognize specific dental structures and anomalies, aiding in the identification of individuals from dental records. Deep learning, a subset of machine learning, utilizes neural networks, particularly convolutional neural networks (CNNs), to process complex image data, enhancing the analysis of dental radiographs and bite mark patterns with high precision. [15] Additionally, AI algorithms such as support vector machines (SVMs) and random forests are employed to classify and predict dental features, further streamlining the identification process. These AI-driven tools not only automate tedious and repetitive tasks but also reduce human error, providing more reliable and consistent results in forensic investigations. By leveraging these advanced AI technologies, forensic odontology can achieve greater accuracy in victim identification and forensic analyses, ultimately enhancing the overall effectiveness of forensic investigations.[11]

The application of artificial intelligence (AI) in victim identification has revolutionized forensic odontology by enhancing the precision and efficiency of the identification process. AI technologies, such as machine learning and deep learning algorithms, are particularly effective in analyzing large datasets of dental records and radiographs. These technologies can quickly identify unique dental patterns and anomalies that are critical for distinguishing individuals, even in cases where traditional methods might fall short. [16] One notable application is the use of convolutional neural networks (CNNs) for the automatic recognition and comparison of dental radiographs. CNNs can analyze and match dental images with a high degree of accuracy, significantly speeding up the identification process in mass disaster scenarios and complex criminal cases (Jones et al., 2020). Additionally, AI-driven systems can integrate various types of dental data, including periapical and panoramic radiographs, to create comprehensive dental profiles that aid in cross-referencing and confirming identities.[17]

The use of artificial intelligence (AI) in bite mark analysis represents a significant advancement in forensic odontology, offering more objective and precise methods compared to traditional techniques. Bite mark analysis traditionally involves manual comparison and visual assessment, which can be highly subjective and prone to inconsistencies. AI technologies, particularly machine learning and deep learning algorithms, have been introduced to address these challenges by automating the analysis process and providing more reliable results.[14] These AI-driven systems can compare bite marks with dental records or molds with high accuracy, reducing the likelihood of human error and enhancing the reliability of forensic evidence.[18] Additionally, AI algorithms can process large datasets of bite mark images to develop predictive models, which can be used to identify suspects with greater confidence. The integration of AI in bite mark analysis not only improves the objectivity of forensic investigations but also accelerates the analysis process, providing timely and accurate information critical for criminal cases.[14]

The application of artificial intelligence (AI) in forensic odontology extends beyond identification and bite mark analysis to include age and sex estimation, which are critical aspects of forensic investigations.[13] AI technologies, particularly machine learning algorithms, have shown significant promise in improving the accuracy and reliability of age estimation based on dental

features. Traditional age estimation methods often rely on visual assessment of dental development stages, which can be subjective and vary between examiners. AI-driven approaches, however, utilize large datasets of dental radiographs and employ sophisticated algorithms to identify subtle patterns and changes associated with aging. Convolutional neural networks (CNNs), for example, can analyze panoramic and periapical radiographs to predict age with high precision, enhancing the consistency and objectivity of forensic assessments.[19]

In addition to age estimation, AI technologies are also being applied to sex estimation from dental records. The sexual dimorphism in dental characteristics, such as tooth size and root morphology, provides valuable information for distinguishing between males and females. Machine learning algorithms can be trained on large datasets to recognize these differences and accurately estimate the sex of an individual based on their dental features. Deep learning models, including CNNs, have been particularly effective in this regard, enabling detailed analysis of dental images and improving the accuracy of sex estimation in forensic cases.[20]

2.3. Integration of AI in Victim Identification and Criminal Case

The integration of Artificial Intelligence (AI) in Disaster Victim Identification (DVI) has significantly advanced the field of forensic odontology, providing tools that can rapidly and accurately process vast amounts of dental data under challenging conditions. In mass disaster scenarios, where timely and precise identification of victims is crucial, AI technologies such as machine learning algorithms and neural networks can automate the analysis of dental records and radiographs, significantly accelerating the identification process. These AI-driven systems can efficiently match dental features with pre-disaster dental records, improving the speed and reliability of identifications, and thereby aiding in the resolution of mass casualty events. However, the use of AI in forensic odontology also raises important ethical considerations. The deployment of AI technologies must ensure the protection of sensitive dental data, maintain transparency in AI decision-making processes, and address potential biases in AI algorithms to prevent erroneous identifications and ensure fairness.[21] Ethical frameworks and regulations must be established to govern the use of AI in forensic applications, ensuring that these technologies are used responsibly and ethically in the pursuit of justice and disaster response.[12]

The integration of artificial intelligence (AI) in criminal case investigations, particularly within forensic odontology, has markedly enhanced the accuracy and efficiency of solving complex criminal cases. AI technologies, such as machine learning and deep learning algorithms, have been deployed to analyze dental evidence with greater precision than traditional methods.[7]For instance, AI algorithms can process and compare dental radiographs, photographs, and bite marks swiftly, identifying unique dental patterns and anomalies that are critical in forensic investigations.[22] These technologies facilitate the rapid and accurate matching of dental records to suspects or victims, significantly expediting the investigative process.[23]

In bite mark analysis, convolutional neural networks (CNNs) have shown exceptional capability in pattern recognition, allowing forensic experts to make more reliable connections between bite marks found at crime scenes and the dental profiles of suspects. This reduces the subjectivity and potential biases inherent in manual comparison methods. [14,24] Moreover, AI systems contribute to a broader forensic analysis by integrating data from various sources, such as dental records, DNA profiles, and other biometric data, to create comprehensive forensic profiles. This holistic approach not only enhances the accuracy of identifications but also improves the overall reliability of forensic evidence presented in court. Furthermore, AI can be used to create predictive models that assess the likelihood of matches between dental evidence and individuals, providing investigators with actionable insights that were previously difficult to obtain. The use of AI in age and sex estimation not only enhances the reliability of forensic analyses but also provides critical information that can aid in the identification process and contribute to the resolution of criminal cases.[11]

Figure 1 presents the theoretical concept underlying the application of artificial intelligence (AI) in forensic odontology. The flow begins with dental data input, such as radiographs, bite mark impressions, and 3D scans. These data are processed using AI technologies, including machine learning and deep learning models like convolutional neural networks (CNNs). Once processed, the output contributes to three major forensic domains: victim identification, bite mark analysis, and age/sex estimation. In victim identification, AI assists in matching postmortem dental records with antemortem data with increased speed and accuracy. For bite mark analysis, AI algorithms identify

unique features and patterns, minimizing human bias and subjectivity. For age and sex estimation, machine learning models analyze dental growth markers and morphological characteristics. Overall, the integration of AI enhances the reliability, consistency, and objectivity of forensic odontology practices.

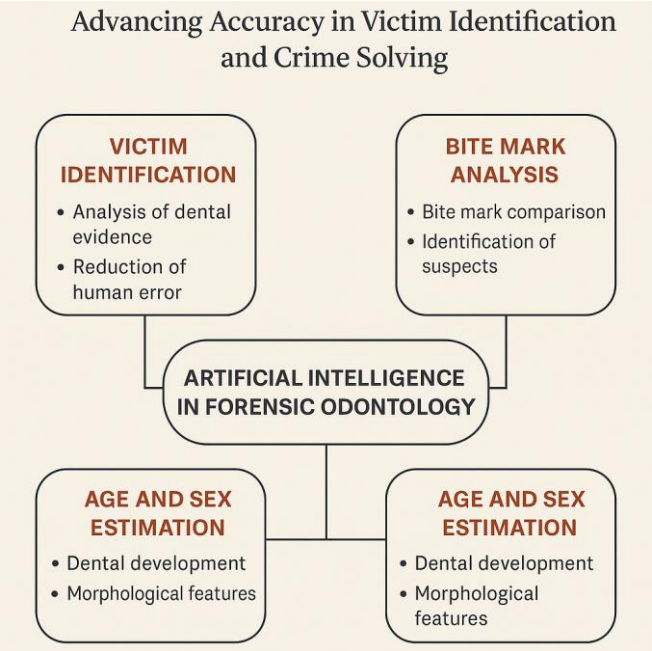

Figure 1. Theoretical Concept of Artificial Intelligence Applications in Forensic Odontology. This infographic illustrates the integration of artificial intelligence (AI) technologies—such as machine learning, deep learning, and convolutional neural networks (CNNs)—into forensic odontology. The concept outlines three core domains: victim identification, bite mark analysis, and age/sex estimation. AI enables precise pattern recognition, automated dental data analysis, and consistent decision-making, improving accuracy and efficiency in forensic investigations.

3. Material and Methods

3.1. Study Design

This study adopts a narrative literature review design aimed at exploring and synthesizing current developments in the application of artificial intelligence (AI) within the domain of forensic odontology. The review emphasizes key areas such as victim identification, bite mark analysis, and age and sex estimation, with the goal of identifying thematic insights, technological advances, and gaps in the literature.

3.2. Data Sources and Search Strategy

A comprehensive literature search was conducted using several electronic databases, including PubMed, Scopus, Web of Science, and Google Scholar. The search focused on articles published between 2015 and 2023. To retrieve relevant studies, a combination of keywords and Boolean operators was employed: "artificial intelligence" AND "forensic odontology" OR "victim identification" OR "bite mark analysis" OR "age estimation" OR "sex estimation" OR "machine learning" OR "deep learning". Only English-language publications from peer-reviewed journals were included. The search process was documented systematically to ensure transparency and reproducibility.

3.3. Inclusion and Exclusion Criteria

Articles were selected based on specific inclusion and exclusion criteria to ensure relevance and quality. The **inclusion criteria** comprised original research articles, systematic reviews, and high-quality narrative reviews that focused on the application of artificial intelligence (AI), machine learning, or deep learning in the field of forensic odontology. Meanwhile, the **exclusion criteria** included studies that were not related to forensic dental science, publications written in languages

other than English, and papers that lacked methodological clarity or scientific rigor. These criteria were applied to ensure that only scientifically sound and thematically relevant studies were included in the review.

3.4. Data Extraction and Synthesis

After identifying relevant articles, the data were extracted and analyzed qualitatively. Core themes were identified and synthesized across studies, including advancements in AI applications, benefits and limitations, methodological challenges, and ethical implications. The narrative synthesis aimed to deliver a comprehensive understanding of how AI technologies are influencing and reshaping forensic odontology and to propose areas for future research and innovation.

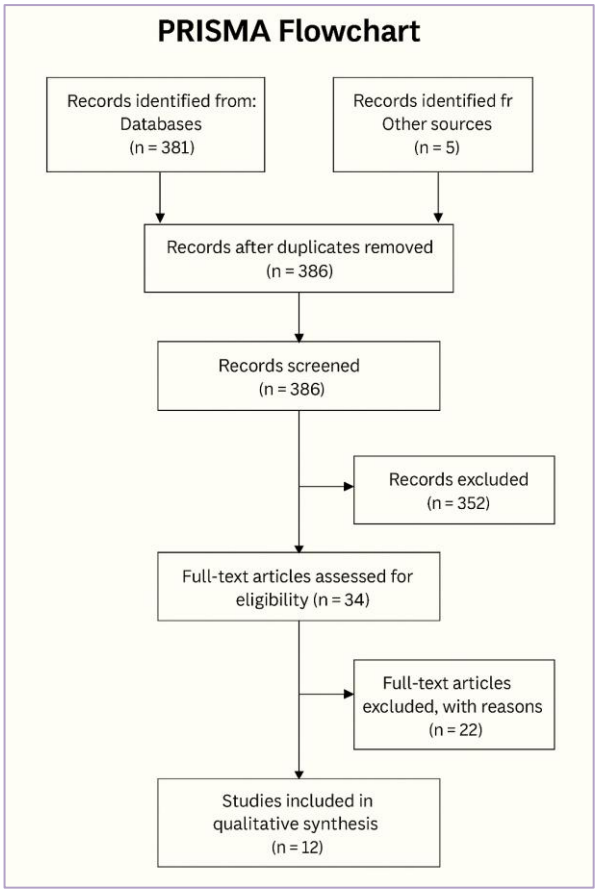

Figure 2. PRISMA Flow Diagram for Article Selection in the Review Process**.** This diagram illustrates the systematic flow of the article selection process based on PRISMA guidelines, including identification, screening, eligibility, and inclusion stages.

Figure 2 shows the PRISMA flowchart used in the systematic article selection process. Initially, a total number of articles were identified through database searches. After removing duplicates, the remaining articles were screened based on their titles and abstracts. Articles that did not meet the inclusion criteria were excluded during the screening and eligibility phases. Finally, the eligible articles that matched the scope and criteria of the review were included for analysis. This structured selection process ensures transparency and methodological rigor in identifying relevant studies for this review.

4. Results and Discussion

4.1. AI for Dental Evidence Analysis and Comparison

The integration of Artificial Intelligence (AI) into forensic odontology, particularly through Convolutional Neural Networks (CNNs), has significantly transformed the analysis and comparison of dental evidence. CNNs are capable of processing extensive datasets consisting of dental

radiographs and clinical images, extracting detailed morphological features such as crown shapes, restorations, and structural anomalies with remarkable accuracy. This technological capability is especially critical in forensic identification, where matching antemortem and postmortem dental records must be performed rapidly and precisely to aid criminal investigations and disaster victim identification (DVI) efforts.[13]

Furthermore, AI facilitates a standardized and objective approach to dental analysis, reducing the subjectivity and inconsistencies often associated with manual interpretations. Traditional methods rely heavily on visual comparison and professional judgment, which are prone to human error and bias. AI-powered tools can produce consistent diagnostic outputs, thus enhancing the reliability of forensic conclusions in legal proceedings. By implementing these systems into routine practice, forensic odontologists can improve both the speed and the accuracy of dental identification procedures, contributing to more efficient case resolutions.[25]

4.2. AI in Bite Mark Analysis

Bite mark analysis has historically faced challenges due to its subjective nature and lack of reproducibility. However, AI, particularly deep learning algorithms like CNNs, has introduced a new level of precision and objectivity. These systems can measure key characteristics such as tooth width, arch pattern, and bite depth through digital image processing, allowing for highly accurate superimposition of bite marks. Such capabilities have the potential to restore the credibility of bite mark evidence when used with caution and scientific rigor [14,26]. AI's role in bite mark analysis extends beyond visualization—it allows for automated classification and comparison against known dental records. This is particularly beneficial in criminal cases where bite marks are a central piece of evidence. Although bite mark analysis remains controversial, the standardization offered by AI may improve its admissibility in court. Still, the application of AI in this area must be accompanied by thorough validation studies and adherence to legal and ethical standards.[12,26]

4.3. Age and Sex Estimation

Age and sex estimation are essential in constructing biological profiles of unidentified individuals. AI algorithms, especially those trained on dental morphometric data, can predict age by analyzing features such as tooth eruption stages, root length, and pulp-to-dentin ratios. These models have demonstrated higher predictive accuracy than conventional methods, which are often reliant on expert interpretation and visual grading scales. In addition to age estimation, machine learning tools have shown efficacy in determining sex based on dental metrics like crown width, arch dimensions, and molar morphology. This is particularly useful in mass fatality events where other identification markers are unavailable. The integration of AI into this domain provides a valuable tool for forensic practitioners, offering objective, reproducible, and scalable solutions that enhance demographic profiling. [20, 27].

4.4. Disaster Victim Identification (DVI)

In disaster scenarios, the swift and accurate identification of victims is critical. AI offers a significant advantage in DVI efforts by automating the comparison of antemortem and postmortem dental records. These systems can match dental structures across thousands of entries with exceptional speed, a process that would otherwise be time-consuming and error-prone if done manually. This application is particularly beneficial in mass casualty events where traditional methods may be overwhelmed. Moreover, AI-enabled platforms can be integrated with international dental databases, promoting collaboration across jurisdictions. This facilitates real-time data exchange and accelerates identification workflows. AI's scalability also ensures that identification processes remain robust even when faced with limited human resources or poor-quality data. As DVI increasingly incorporates digital tools, AI stands out as a vital asset in improving the responsiveness and effectiveness of forensic operations. [22,23]

4.5. Efficiency and Future Outlook

One of AI's most prominent advantages is its capacity to process vast datasets in real time, which greatly enhances operational efficiency. In forensic odontology, this means quicker turnarounds in case assessments, faster identification of victims or suspects, and the minimization of procedural bottlenecks. AI can also serve as a triage tool, flagging high-priority matches or anomalies

for further expert review, thus optimizing expert time and resources. [1,23] Looking forward, AI is poised to revolutionize not only the analytical phase but also education and reporting in forensic odontology. Future developments may include AI-driven simulation platforms for student training, automated case reporting tools, and mobile applications for field data collection. Nonetheless, challenges remain—particularly in ensuring data privacy, algorithm transparency, and model generalizability. Addressing these concerns is crucial for the ethical and sustainable implementation of AI in this evolving field. [28]

6. Conclusion

The application of artificial intelligence (AI) to forensic odontology has transformed criminal case investigations by improving the accuracy and efficiency of dental evidence processing. AI technologies, particularly machine learning algorithms like convolutional neural networks (CNNs), can process large datasets of dental images and radiographs, identifying unique patterns and anomalies with high precision. This capability is crucial in criminal cases for the accurate identification of suspects or victims, reducing human error and bias inherent in traditional methods. AI-driven systems provide standardized, objective results, improving reliability in forensic investigations. Additionally, AI extends to age and sex estimation, further broadening its forensic applications. The use of AI in Disaster Victim Identification (DVI) demonstrates its ability to quickly and reliably process large volumes of dental data, significantly accelerating investigation processes and enhancing the overall effectiveness of forensic odontology

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8. References

1. Chang Y-J, Muthukumaran RB, Chen J-L, et al. Simultaneous determination of areca nut-and tobacco-specific alkaloids in saliva by LC-MS/MS: Distribution and transformation of alkaloids in oral cavity. Journal of Hazardous Materials 2022;426:128116.
2. Smitha. Artificial Intelligence in Forensic Odontology. J Forensic Dent Sci. 2023 Feb 19;13(1):01–2.
3. Schwendicke F, Samek W, Krois J. Artificial Intelligence in Dentistry: Chances and Challenges. J Dent Res. 2020 Jul 1;99(7):769–74.
4. Ma XF, Jin M, Sun H, Mi CB. Application Status and Prospect of Bite Mark Evidence in Forensic Odontology. Vol. 36, Journal of Forensic Medicine. 2020.
5. Ding H, Wu J, Zhao W, Matinlinna JP, Burrow MF, Tsoi JKH. Artificial intelligence in dentistry—A review. Vol. 4, Frontiers in Dental Medicine. Frontiers Media S.A.; 2023.
6. Manickam Natarajan P, Mathew A, Bhavrao Desai V, Thomas S, Abuhijleh E, Srinivasan S. Forensic Odontology-A Review. Indian Journal of Forensic Medicine & Toxicology. 2020;14(4):4143.
7. Favaretto M, Shaw D, De Clercq E, Joda T, Elger BS. Big data and digitalization in dentistry: A systematic review of the ethical issues. Vol. 17, International Journal of Environmental Research and Public Health. MDPI AG; 2020.
8. Forrest A. Forensic odontology in DVI: current practice and recent advances. Vol. 4, Forensic Sciences Research. Taylor and Francis Ltd.; 2019. p. 316–30.
9. Wadhawan R, Mishra S, Lau H, Lau M, Singh A, Mansuri S, et al. Current state and trajectory of artificial intelligence in dentistry: A review. The Journal of Dental Panacea. 2024 Jun 28;6(2):56–9.
10. David TJ, Lewis JM. Forensic odontology: Principles and practice. Forensic Odontology: Principles and Practice. 2018.
11. Cardoza A. Forensic Odontology and Bite Mark Analysis: Understanding the Debate. Vol. 51, Journal of the California Dental Association. 2023.
12. Khanagar SB, Vishwanathaiah S, Naik S, A. Al-Kheraif A, Devang Divakar D, Sarode SC, et al. Application and performance of artificial intelligence technology in forensic odontology – A systematic review. Vol. 48, Legal Medicine. 2021.
13. Hachem M, Mohamed A, Othayammadath A, Gaikwad J, Hassanline T. Emerging applications of dentistry in medico-legal practice-forensic odontology. International Journal on Emerging Technologies. 2020;11(2).

14. Mohammad N, Ahmad R, Kurniawan A, Mohd Yusof MYP. Applications of contemporary artificial intelligence technology in forensic odontology as primary forensic identifier: A scoping review. Vol. 5, Frontiers in Artificial Intelligence. 2022.
15. Chandramouleeswaran M, Puviarasan N. Intelligent bite marking analysis and classification using deep convolutional neural network based Xception model. Int J Health Sci (Qassim). 2022 Jun 23;12440–56.
16. Thurzo A, Urbanová W, Novák B, Czako L, Siebert T, Stano P, et al. Where Is the Artificial Intelligence Applied in Dentistry? Systematic Review and Literature Analysis. Vol. 10, Healthcare (Switzerland). 2022.
17. Valsecchi A, Gómez O, González A, Macias M, De Dios M, Panizo M, et al. Skeleton-ID: AI-driven Human Identification. In: Proceedings - 2023 IEEE Conference on Artificial Intelligence, CAI 2023. 2023.
18. Piraianu AI, Fulga A, Musat CL, Ciobotaru OR, Poalelungi DG, Stamate E, et al. Enhancing the Evidence with Algorithms: How Artificial Intelligence Is Transforming Forensic Medicine. Vol. 13, Diagnostics. Multidisciplinary Digital Publishing Institute (MDPI); 2023.
19. Wallace JR. Computer-aided image analysis of crayfish bitemarks — reinterpreting evidence: A case report. Forensic Sci Int. 2019;299.
20. Milošević D, Vodanović M, Galić I, Subašić M. Automated estimation of chronological age from panoramic dental X-ray images using deep learning. Expert Syst Appl. 2022;189.
21. Bu W qing, Guo Y xin, Zhang D, Du S yi, Han M qi, Wu Z xuan, et al. Automatic sex estimation using deep convolutional neural network based on orthopantomogram images. Forensic Sci Int. 2023;348.
22. Chidambaram R. Forensic odontology: A boon to community in medico-legal affairs. Vol. 54, Journal of the Nepal Medical Association. 2016.
23. Vishnurao SG. Digital forensics – A gain to dentistry. IP International Journal of Maxillofacial Imaging. 2023;9(2).
24. Jadhav E, Singh Sankhla M, Kumar R. Artificial Intelligence: Advancing Automation in Forensic Science & Criminal Investigation. Seybold Report. 2020;15(August).
25. Khan T, Sunil MK, Yeluri G, Srivastava S, Srivastava M, Mehfooz A. Bite Marks : The Odontologic Methapor For Finger Prints. TMU J Dent. 2020;7(1).
26. Faqir RSA. Digital Criminal Investigations in the Era of Artificial Intelligence: A Comprehensive Overview. International Journal of Cyber Criminology. 2023;17(2).
27. B DrS, BM A, Fareed DrN, Babashet DrM, Srivathsa DrSH. Credibility of bite mark analysis in forensic odontology: A diagnostic accuracy trail. International Journal of Forensic Medicine. 2024;6(1).
28. Beladavar C, Acharya AB, Angadi P. Sex Estimation in Indians by Digital Analysis of The Gonial Angle on Lateral Cephalographs. Journal of Forensic Odonto-Stomatology. 2019;37(2):45–50

Authors Contribution

Contribution	Fauziah YA	Narmada IB	Yudianto A	Darmadi EY
Concepts or ideas	√	√	√	√
Design	√			√
Definition of intellectual content	√		√	
Literature search	√	√	√	√
Manuscript preparation	√	√	√	√
Manuscript editing	√			√
Manuscript review	√	√	√	

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