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Editorial

Digital forensics – A gain to dentistry

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ABSTRACT

The ability of machines to carry out tasks that typically involve human intelligence is known as artificial intelligence (AI). It is a development in computer science that solves a number of intricate problems that are currently plaguing society. These models have shown to be a breakthrough in terms of delivering trustworthy information for decision making, and their main benefit is that they offer logic for clinical decision making. Consequently, AI may play a big part in forensic dentistry (FO). In order to serve the welfares of justice, FO entails the examination, assessment, administration, and presentation of dental evidence in criminal or civil cases. It is an essential component of forensic science that is key to the identification of people, whether they are living or dead. In terms of gathering, evaluating, and reporting evidence, digital forensics has successfully and consistently supplanted traditional forensic investigations. Therefore, learning and understanding in this area are necessary.

1. Introduction

A key component of forensic science that is essential to the identification of people, whether they are living or dead, is forensic odontology. During identification, it can need for a clinical or visual approach.[1] Sometimes it may be necessary for forensic professionals to make use of the already-in-use method to identify people, such as by estimating the age of the teeth using an atlas. Identification of the victim, the offender, or the method of the crime has become a creative process in today's society as crime-related incidents are on the rise.[2] Traditional forensic investigations have been efficiently and consistently supplanted by digital forensics in terms of gathering, processing, and reporting evidence.[3] Big data (derived from digital devices), processing power, and AI algorithms have all advanced rapidly over the past 20 years, and as a result, applications for AI have been developed to make people's lives more convenient.[4] In dentistry, AI has been espoused in all dental disciplines, i.e., operative dentistry, periodontics, orthodontics, oral and maxillofacial surgery, and prosthodontics.[5]

Artificial intelligence has made significant strides thanks to the development of massive data analysis technology, the use of these technologies for mode identification, in-depth learning, and computer vision techniques.[6] In recent years, forensic researchers from both domestic and international institutions have carried out a number of studies based on artificial intelligence technology, including face recognition, age and gender identification, DNA analysis, post-mortem interval estimation, injury and cause of death identification, demonstrating the viability and benefits of using artificial intelligence technology to solve forensic identification problems.[7]

A wide range of cutting-edge technologies that continue to have an impact on daily life are included in AI. Big data analysis is now possible because to the development of

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AI, which delivers trustworthy information and facilitates decision-making.[8] As a result of the demand for greater patient care and accurate diagnosis, AI technology has had an impact on the medical industry. Due to the demand for precise treatment approaches and immediate information interchange, AI will continue to integrate with dentistry from a broad perspective despite potential misunderstandings and privacy concerns.[9] Additionally, such advancements will allow professionals to share big data that relates to health and give insights to hospitals, clinicians, researchers, and patients to enhance patient care.[5] It was John McCarthy for the first who coined the term artificial intelligence in 1954.

Types of AI of relevance to healthcare:[10]

1. Machine Learning- Neural networks and deep learning
2. Natural Language Processing (NLP - Statistical and Semantic NLP)
3. Rule-based expert systems
4. Physical Robots
5. Robotic process automation

2. Applications of Artificial Intelligence in Forensic Odontology include:[4,10,11]

1. **Facial reconstruction:** Computerized facial reconstruction method uses a laser video camera interfaced with a computer or with CT scanning.
2. **Age estimation:** With the arrival of artificial intelligence, quite a few programming neural networks can train computers to automatically estimate age and also assist in reconstructive identification.
3. **Gender determination:** Artificial neural networks are used for gender determination from skeletal structures, with 95% accuracy. Artificial intelligence methods will eliminate human bias, require no special expertise and provide rapid results when used for gender estimation of skeletal remains.
4. **Lip prints:** A novel biometric system based only on lip contours and new lip geometrical measurements, in contrast to other methods like the texture of the lip surface, is employed using a Probabilistic Neural Network for lip based biometric verification.
5. **Bitemarks:** AI can develop trained networks that can give a reasonable matching accuracy by choosing some explicit features of the bite marks which are acquired and analyzed on a given model. If bite marks are obtained as ante-mortem records and stored in a database, then via algorithms developed through AI, they can be matched with post-mortem records and be a useful source of positive identification.
6. **Personal identification:** In crime scene investigations, AI is often used as a tool for individual documentation. Personal Identification System, based on Meta-Heuristic Algorithm, reported an identification percentage of 97.7% when using Dental Panoramic Radiograph.

3. Defies of AI

Major obstacles to the application of AI systems in the healthcare industry include the administration and sharing of clinical data. Another issue is ambiguous accountability when using AI systems.[5] For initial training, continuing validation, and enhancement of AI systems, personal data from patients are required. Additionally, data exchange between institutions and, in certain circumstances, across international borders, will be prompted by the growth of AI. Systems must be modified to preserve patient privacy and confidentiality in order to integrate AI into healthcare operations. Safety concerns with AI systems also exist. Mechanisms must be developed to regulate the standard of AI algorithms.

4. Conclusion

Applications of AI are becoming more prevalent in fields hitherto regarded to be the domain of human specialists. AI has a great deal of promise to revolutionise the medical and dental fields by enhancing patient care.

5. Conflict of Interest

None.

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