



ARTIFICIAL INTELLIGENCE (AI) IN DENTISTRY- A REVIEW ARTICLE

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ABSTRACT

Artificial Intelligence (AI) is a technology that combines computer and robots to perform tasks usually done by humans because they require human intelligence. AI has proved to be very helpful in various sections of life and dentistry is no exception. AI dentistry in healthcare sector today focuses on diagnosis, storage of data and assessment of genetic information. This article review describes how AI is a game changer in dental field.

KEYWORDS: Artificial intelligence, diagnostic system, machine learning, neural network, future dentistry.

INTRODUCTION

American mathematician John McCarthy coined the term artificial intelligence in 1955, and is widely recognized as the father of artificial intelligence. He choose this term to explain the potential of machines to perform tasks that can fall in the range of "intelligent" activities.^[1] According to "Barr and Feigenbaum", AI is the part of computer science concerned with designing an intelligent computer system that exhibits characteristics associate with intelligence in human behavior- understanding language, learning, reasoning, problem solving, and many more.^[2] To understand AI, it is important to know these key aspects.

- Artificial Intelligence: Enabling machines to think like humans
- Machine Learning: Training machines to get better at a task without being explicitly programmed.
- Neural Networks: Network of artificial neurons or nodes inspired by biological neural network.
- Deep Learning: A subset of machine learning that uses multi-layered networks for machine learning.

APPLICATIONS OF AI IN DENTISTRY

Radiology

Convolutional neural network (CNN) has shown great ability in identifying various anatomical structures. CNNs have demonstrated a precision rate of 95.8-99.45% in detecting and identifying teeth.^[3,4] CNNs have also been used for the detection and diagnosis of dental caries.^[5]

Orthodontics

Artificial intelligence eliminates the requirement for making patient impressions as well as various laboratory steps that are usually followed by using intraoral

scanners and cameras which work on the principles of AI. These results are usually more accurate than human perception. The tooth movement and final treatment outcome can be predicted by using various algorithms and statistical analysis.^[6]

Periodontics

Artificial intelligence is currently used as a method in diagnosing and predicting the prognosis of various periodontal diseases. Lee and coworkers^[7] used a deep learning-based convolutional neural network algorithm in diagnosis and prediction of periodontally compromised teeth.

Endodontics

Saghiri et al.^[8] used artificial neural network (ANN) system in determining the working length and showed 96% accuracy which is much higher when compared to professional endodontics. AI is also used in endodontics to locate the minor apical foramen and in diagnosis of vertical root fractures. Johari et al.,^[9] used probabilistic neural network (PNN) for diagnosis of vertical root fractures. This PNN system showed accuracy up to 96.6%.

Oral Pathology

Early detection and diagnosis of oral lesions is of crucial importance as it significantly improves the prognosis. CNN has been used in the process of diagnosis of head and neck cancer lesions with accuracy at 80-83.3% which is high when compared to specialists.^[10,11]

CONCLUSIONS

AI has potential to revolutionize the entire dentistry by leaving no stone un-turned, also by providing early

diagnosis, better dental care at lower cost to benefit patients. AI is still in its early stage and needs further studies for better clinical performance.

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