Artificial Intelligence in Dentistry

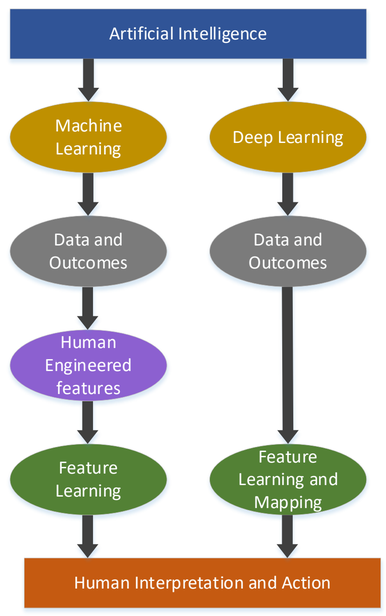
Dr. Sangeetharaj Sheela, BDS
Azeezia College of Dental Sciences and Research, India

INTRODUCTION

Artificial intelligence (AI) was first coined by John McCarthy and it refers to the idea of building machines that are capable of performing tasks that are normally performed by humans. This intelligent capability can be implemented by sequences of algorithms.

Machine learning, a subdomain of AI depends on algorithms to predict outcomes based on a dataset. Machines learn from large dataset and they resolve issues without human input.

Deep learning is a component of machine learning that utilizes the multilayered (deep) neural networks to analyze the input data. This neural network automatically identifies patterns to improve feature detection.



APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN DENTISTRY

Oral Pathology

- Diagnosis of head and neck cancer lesions
- Risk assessment of oral cancers
- Early diagnosis of Oral Squamous Cell Carcinoma

Periodontics

- Differentiation between aggressive and chronic periodontitis
- Diagnosing and predicting the prognosis of Periodontally Compromised Teeth (PCT)
- Detection of Periodontal Bone Loss (PBL) on panoramic dental radiographs

Orthodontics

- Treatment planning and treatment outcome analysis
- Determination of tooth extraction before orthodontic therapy in patients with malocclusion
- Digital impression and predictions of tooth movements

Radiology

- Detection of dental caries
- Identification of anatomical structures
- Cephalometric analysis

Oral and Maxillofacial Surgery

- Robot assisted surgeries
- Planning surgeries with reduced operation time
- Image guided surgery that helps in accurate surgical resection
- Predicting postoperative facial swelling after extraction of teeth

Prosthodontics

- CADCAM, Design inlays, onlays, crowns and bridges
- Smile design – shape and alignment of future smile
- Preparation margin detection before sending on for crown design in the dental laboratory

LIMITATIONS

- Extra caution must be taken to safeguard medical information of patients. Exchange of training sets and applying models should be performed with care to avoid violation of HIPAA regulations.
- Mechanism/system complexity and costly setup.
- Chances of misinterpretation of data.

CONCLUSION

Although Artificial Intelligence systems has the potential to revolutionize oral health care by addressing the weaknesses in conventional dental care, AI systems can in no way replace the role of dentist. Further studies are required to assess the clinical performance of AI techniques in dentistry.

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