

## A New Eye in Dental Sciences: Artificial Intelligence

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In the era of digitization, various technological advancements are not limited to the medical field. In fact, there has been a great uptake of such innovative technologies in dentistry too. One such recent trend going on in the field has been categorized as “Artificial Intelligence” or “Machine Intelligence”. It is defined as theory and development of computer systems working in collaboration with the human intelligence. The idea is to move further with the establishment of machines that can work and perform various tasks being performed by the humans. Machine learning (ML) is a subcategory of AI, in which algorithms are applied to learn the intrinsic statistical patterns and structures in data, which allows for predictions of unseen data. A popular type of ML model are neural networks (NNs), which outperform more classical ML algorithms in particular on complex data structures such as imagery or language. The term “deep learning” is a reference to deep (multi-layered) NN architectures. These are particularly useful for complex data structures, such as imagery.

AI is doing pretty well in both medical and dental sciences. As far as the sectors of dentistry are concerned, in almost every field, AI has proven its worth to the best possible manner. As a general practitioner, AI has helped to reduce paperwork and to keep patient’s data in a more systematic way. AI has also remarkably improved the diagnosis by aiding various diagnostic tools namely CBCT, MRI etc. for screening a wide variety of lesions and tumours related to the oral cavity. It furthermore helps in treatment planning i.e. for planning surgeries and even for Bioprinting to help in regeneration of both hard and soft tissues. The field of Forensics in dentistry has also enjoyed the beauty of AI as the Neural Networks help to identify the age of the patient. AI is exceptionally doing well to motivate patients for all sorts of dental treatments and even educating them to follow preventive practices in dentistry. The students are also gaining a lot from this magical technology as the virtual systems can demonstrate various procedures in the best possible way. The periodontal status as well as the bone changes in volume and density can be easily examined which is again fruitful in the field of Implantology. No less is the field of Orthodontics and Dentofacial Orthopaedics in a way to provide diagnosis and treatment planning in the most accurate manner. This has also proven to be a boon in providing Clear Aligner Therapy.

AI is slowly nudging its head in the field of Prosthodontics and will continue to do so. There has been a breakthrough in the field with special emphasis on CBCT (Cone Beam Computed Tomography) and 3D scans for Implant Prosthodontic diagnosis in a more precise manner. In fact, with the use of AI for precise fabrication of surgical templates and determining the bone quality, the results have been exceptional. The use of computer-aided design (CAD) and computer-aided manufacturing (CAM) and furthermore Rapid Prototyping (RP) technologies gained much importance in the field. However, with the introduction of AI using generative adversarial networks, laboratories are using AI to automatically generate advanced dental restoration, designed for perfect fit and ideal function of the prosthesis while exceeding aesthetic expectations. The Virtual Reality Simulation has proven to be boon in facial aesthetics. This has proved to be a boon in the Prosthodontic sector as well as in maxillofacial prosthodontics for the successful fabrication and prosthetic rehabilitation with cranial prosthesis. Keeping in view the various fields of dentistry, the status of such innovations have been enjoyed maximally by “prosthodontists”.

Henceforth, the technologies are advancing day by day. The field of “dentronics” using a combination of AI with Robotic systems is evolving. The field of Dentistry is rapidly progressing to a new era of data-driven and robot-assisted medicine. It is actually required that the dental surgeons need to be well versed with the upcoming technologies and try to upgrade themselves with the new skills using such magnificent technologies.

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