

## Application of Artificial Intelligence in Orthodontics: Current State and Future Perspectives

Artificial Intelligence (AI) is a subfield of computer science that refers to the ability of a machine to imitate cognitive functions of human intelligence. Artificial intelligence (AI) is revolutionizing orthodontics by enhancing diagnostic precision, streamlining treatment planning, and improving patient outcomes. AI-powered tools, such as machine learning algorithms and computer vision systems, automate tasks like cephalometric analysis and growth prediction, reducing errors and providing orthodontists with accurate, real-time data. Notable applications include AI-driven aligner therapy, which personalizes treatment plans, and its integration into 3D printing and robotic-assisted orthodontics, offering greater efficiency and patient comfort. Despite its promise, challenges such as ethical concerns, data security, and the need for robust validation remain. Future developments may include real time monitoring of patient compliance, adaptive treatment algorithms, and predicting genetic predispositions to malocclusions. For orthodontists in Pakistan, adopting AI is essential to stay at the forefront of innovation. Collaborations between clinicians, researchers, and technologists are critical to unlocking AI's full potential responsibly. The future of AI in orthodontics is bright, poised to redefine how we improve smiles worldwide.

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