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AI-based Advanced Segmentation for Computer Assisted Implant Surgery

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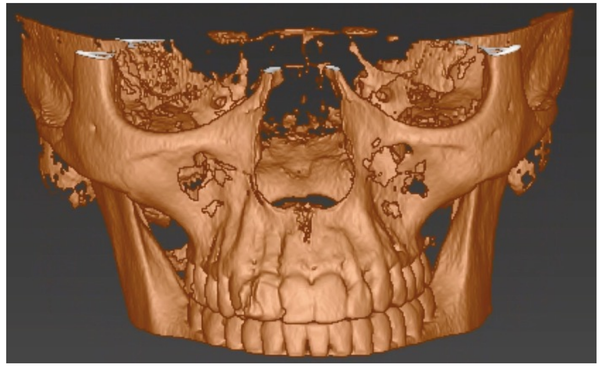
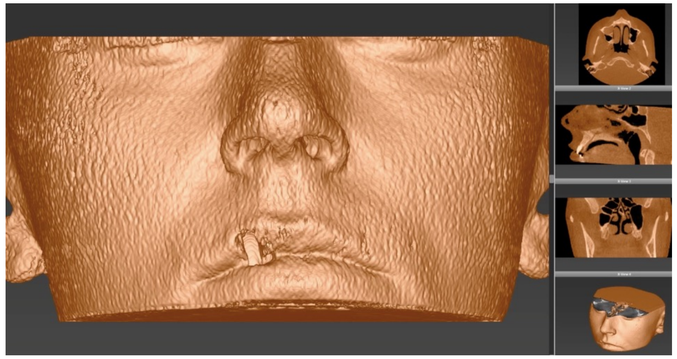
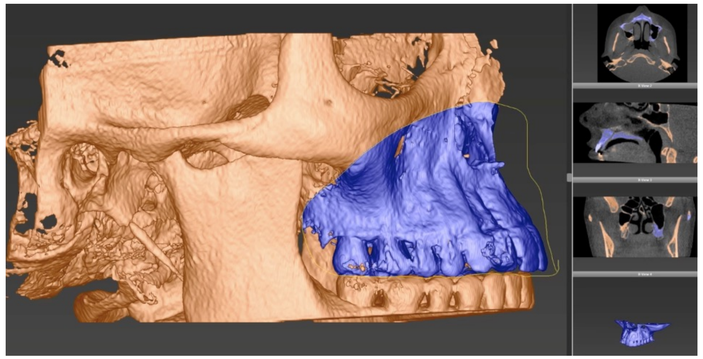
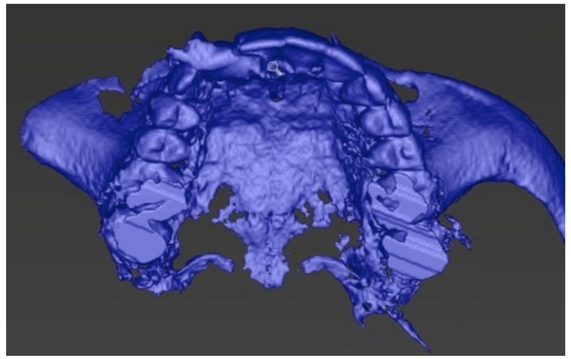
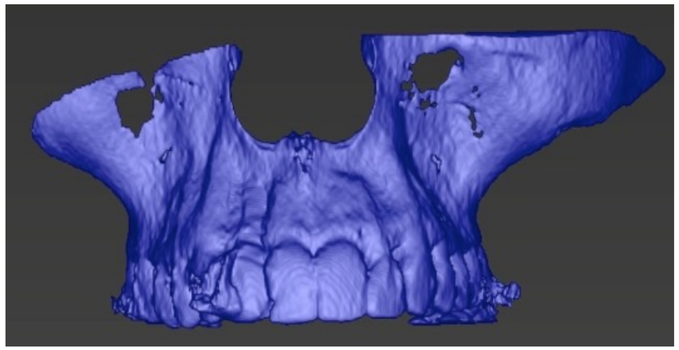
Analog **Segmentation vs** AI-based Advanced **Segmentation**

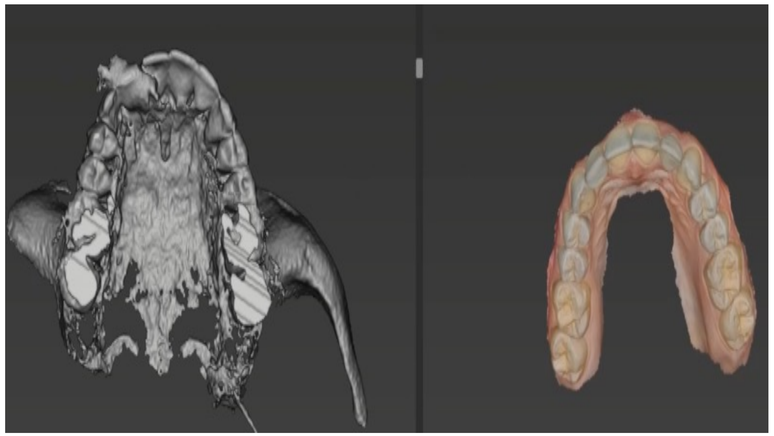


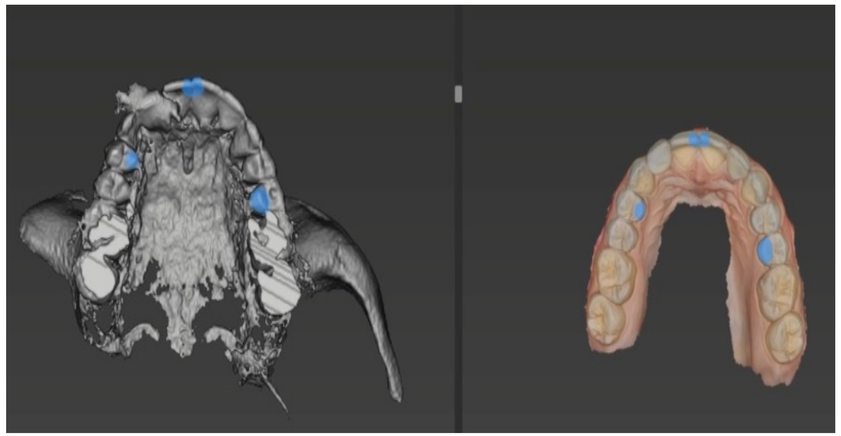












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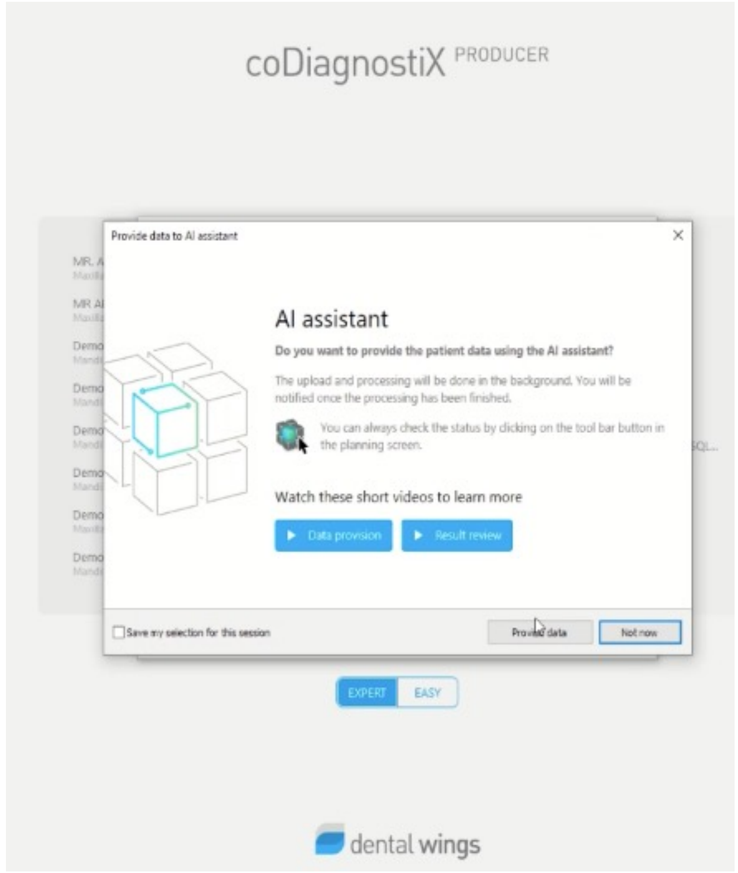

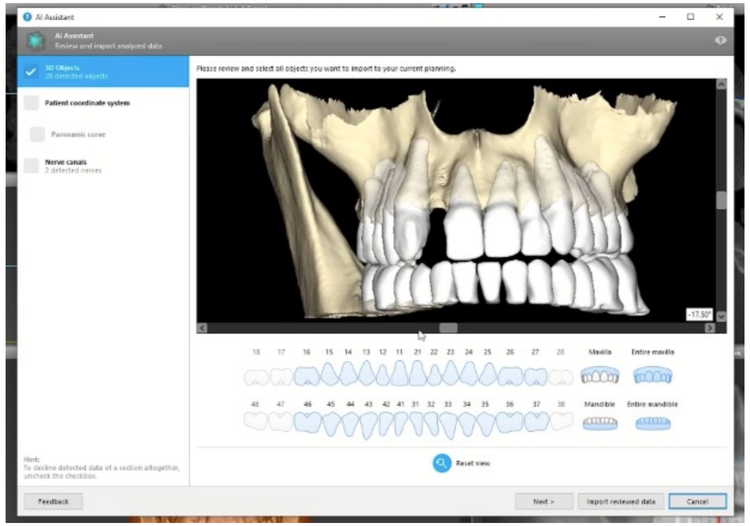

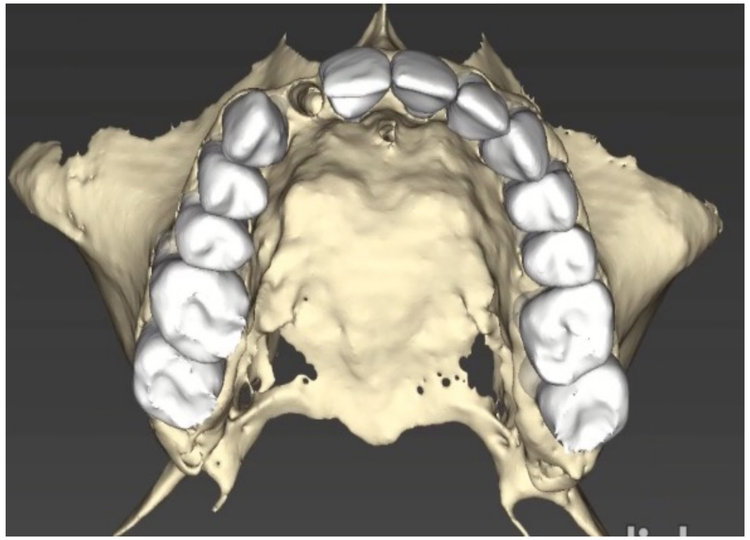

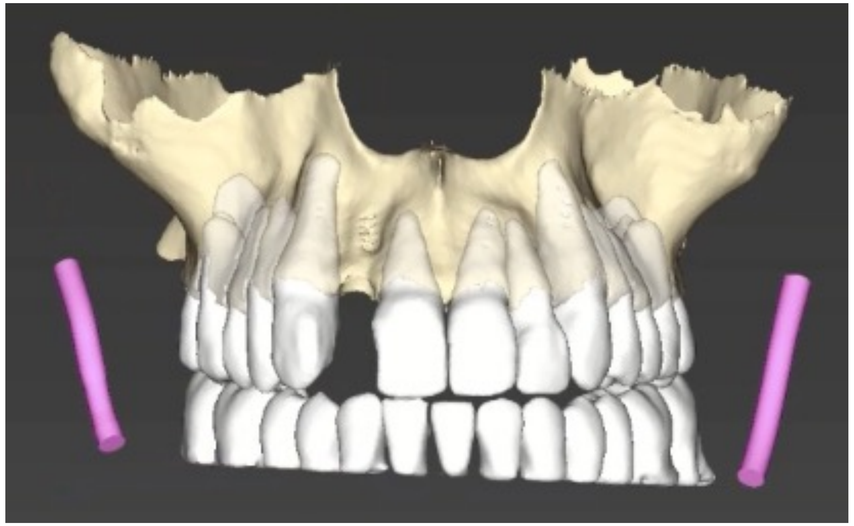

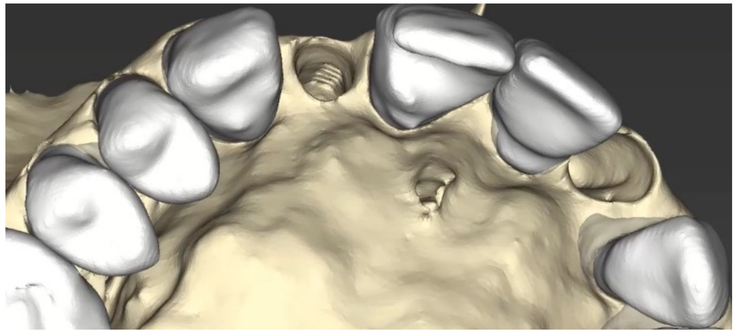

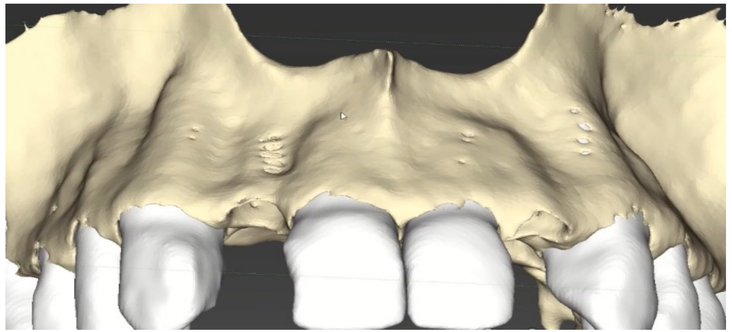

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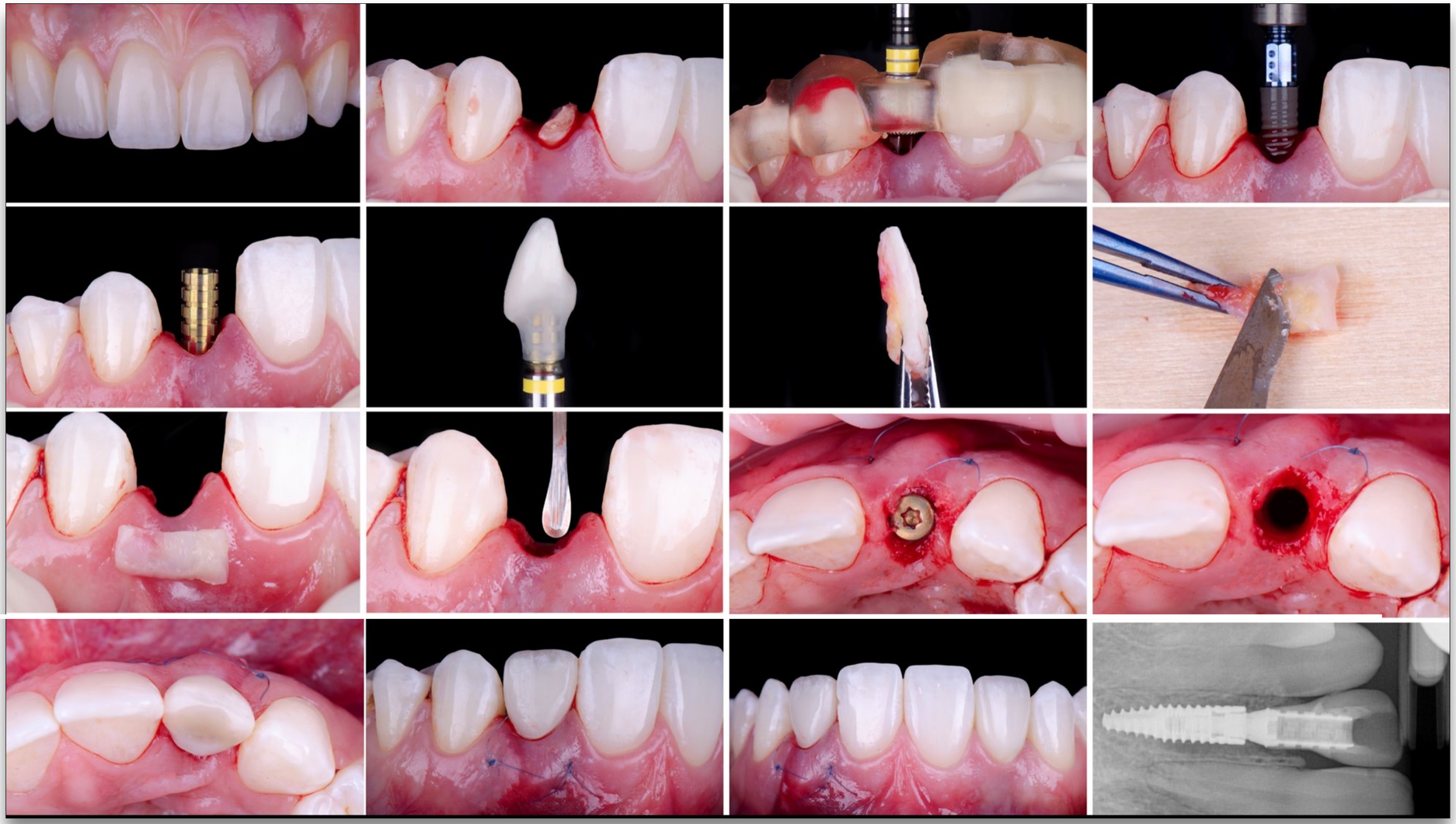

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Introduction: **Image segmentation** is the process of dividing an image into distinct, meaningful regions, and it plays a vital role in the structural identification and quantitative assessment of dental structures. In the realm of Digital Dentistry, the **3D visualization** of human teeth has become an indispensable component for computer aided diagnostics and treatment planning. Moreover, the virtual 3Dmodelingof the maxillary alveolar bone holds particular significance in enhancing the predictability and reliability of pre-surgical planning, especially in Implantology.

Method: Patient presented to clinic for failing tooth #10. Using the AI tool on coDiagnostiX®, computer assisted implant surgery was planned and executed using this helpful tool.

Discussion: Recently developed, **Deep Learning** is a form of artificial intelligence that involves training neural networks **to recognized patterns and make predictions**. This has paved the way for the utilization of three-dimensional convolutional neural networks (CNN), offering new horizons in the processing of 3D images, including CBCT scans. Among the **three main groups of application of CNN-detecting, segmenting and classifying structures** - the segmentation process has greatly improved regarding speed and accuracy with the incorporation of fully CNN.

Considerations:

EFFICIENCY

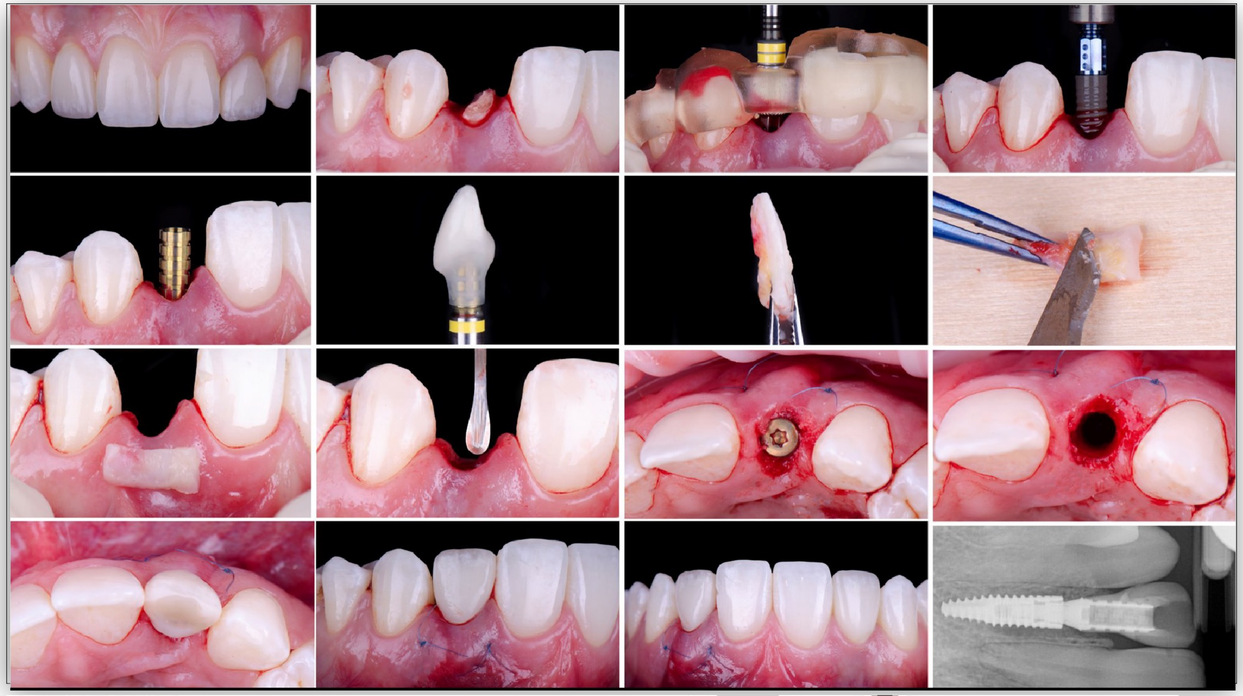
Auto-segmentation saves time by automating a process that would otherwise be done manually

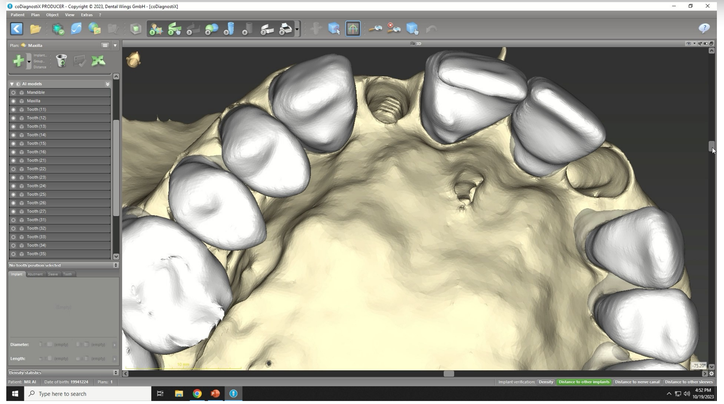
CONSISTENCY

I**t reduces inter-operator variability**, ensuring that the same structures are segmented consistently across different cases

ACCURACY

Deep Learning algorithms can achieve **high accuracy** in identifying structures, often comparable to the manual segmentation





REFERENCES