

Dental Caries Detection App Using Object Detection Model

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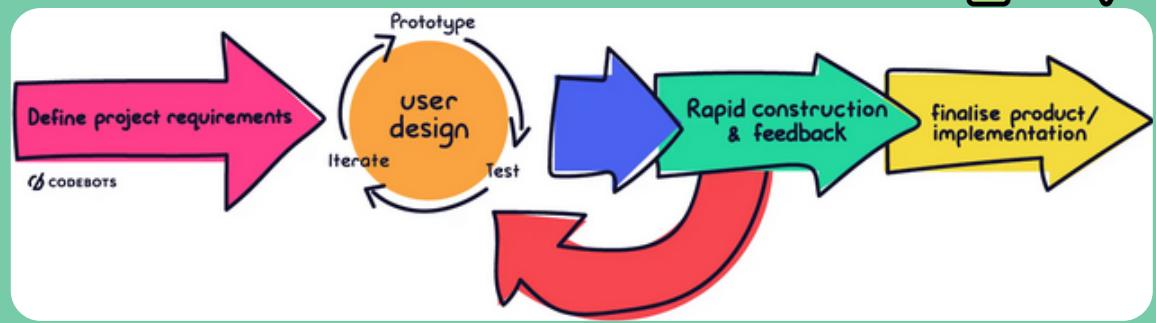
INTRODUCTION

The 'DentXpert' app aims to provide patients with features like Caries Detection, Caries Report Access, Notifications, and Appointment Seeking. The objective is to revolutionize dental care by enhancing patient engagement, early caries detection and enabling efficient dentist-patient interactions.

LITERATURE REVIEW

Studies have been highlighting the necessity of early detection of caries for quite some time now. Current studies emphasize the role of technology, specifically machine learning, in precise caries detection, highlighting its potential to transform dental care significantly.

METHODOLOGY



OBJECTIVES

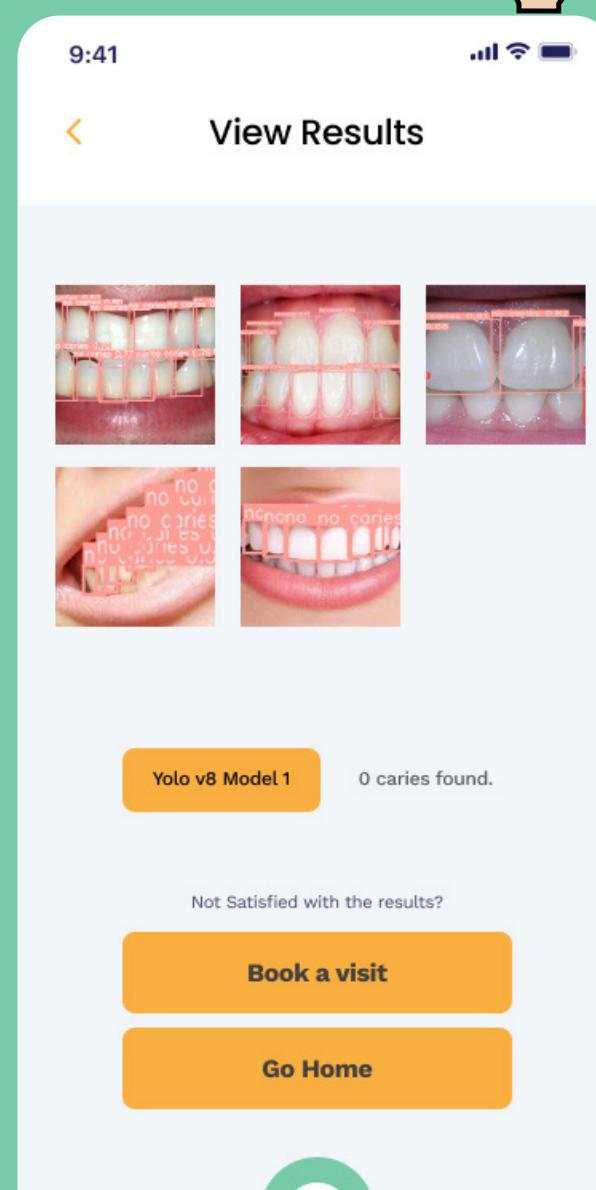
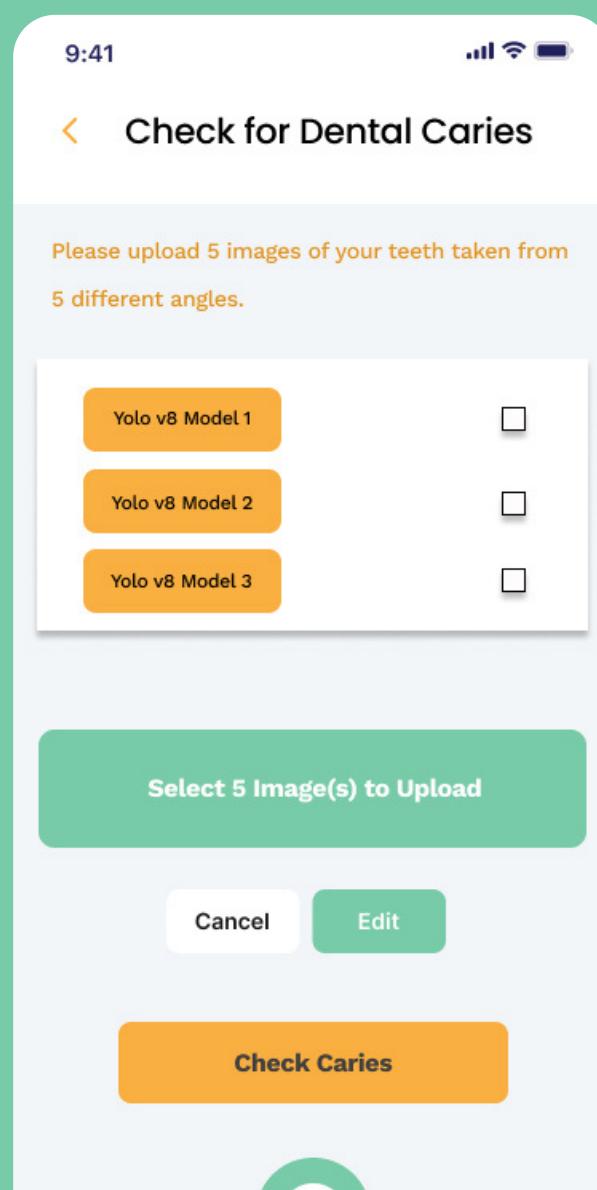
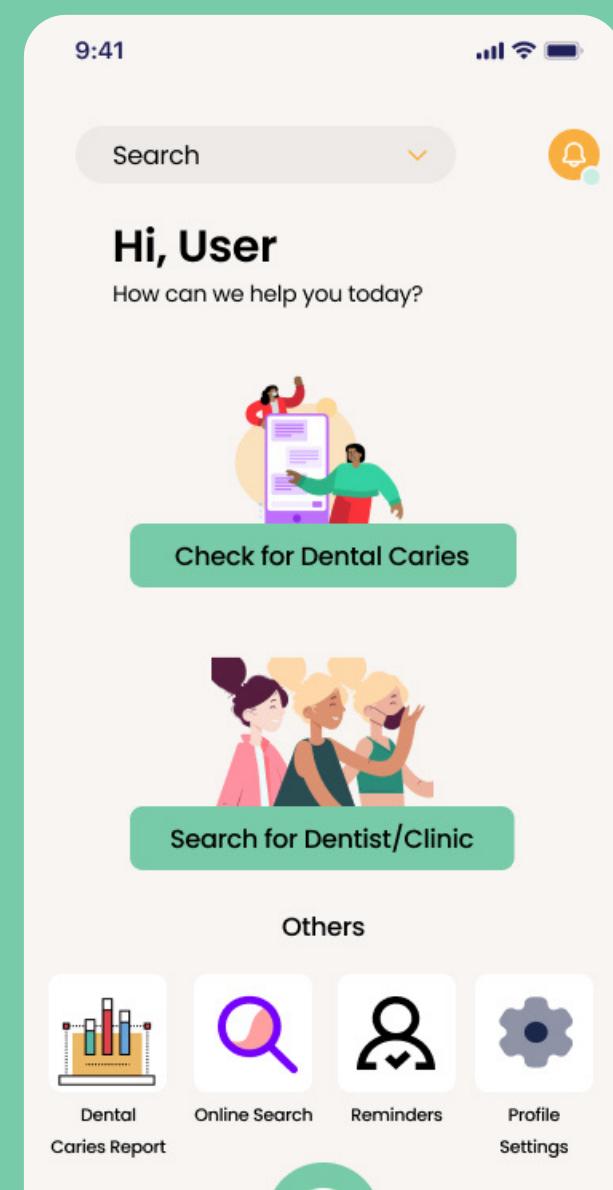
1. Early Caries Detection by using accurate Deep Learning Model.
2. Enhanced Patient Engagement by enabling patients to access dental reports, reminders, and caries detection tools.
3. Easy Appointment Access by assisting patients in booking an appointment effortlessly and assisting dentists in managing appointments and accessing patient reports seamlessly.



PROBLEM STATEMENT

The identification of dental caries, especially at an early stage, allows the preservation of healthy dental hard tissue. Detecting cavities early poses a significant challenge. Our aim is to develop a user-friendly system that seamlessly integrates advanced caries detection tool, along with easy appointment seeking.

INTERFACE



REFERENCES

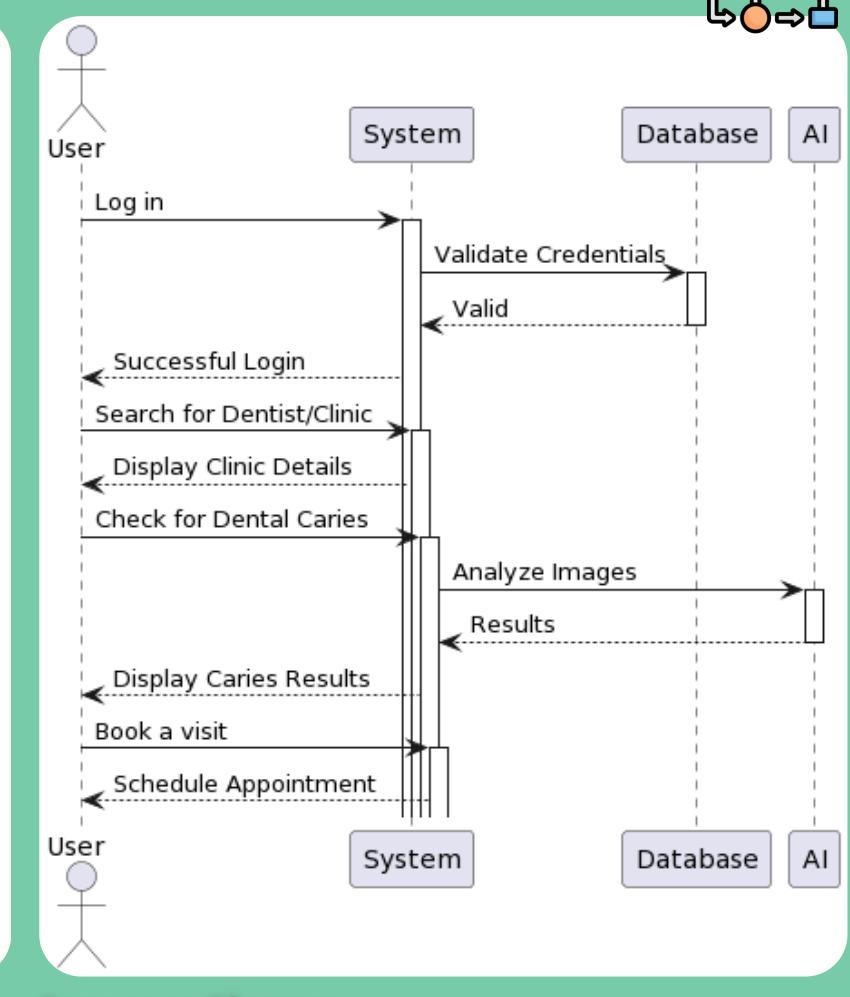
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Smart dental app uses AI and IOT for early disease detection (2020) Innovate. Available at: <https://innovate.ieee.org/innovation-spotlight/smarter-dental/> (Accessed: 30 October 2023).

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UML DIAGRAMS



Use Case Diagram



Sequence Diagram

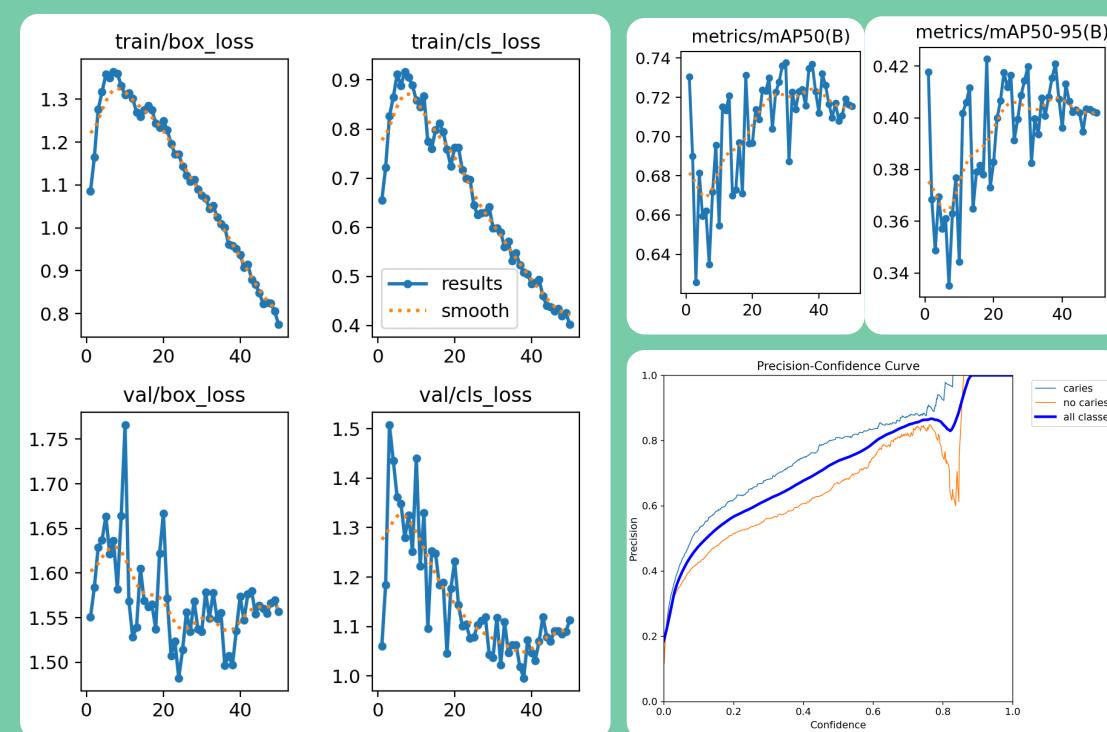


TOOLS

Anaconda Navigator
Pycharm Community
Figma
Ultralytics yolov8



MODEL DEVELOPMENT



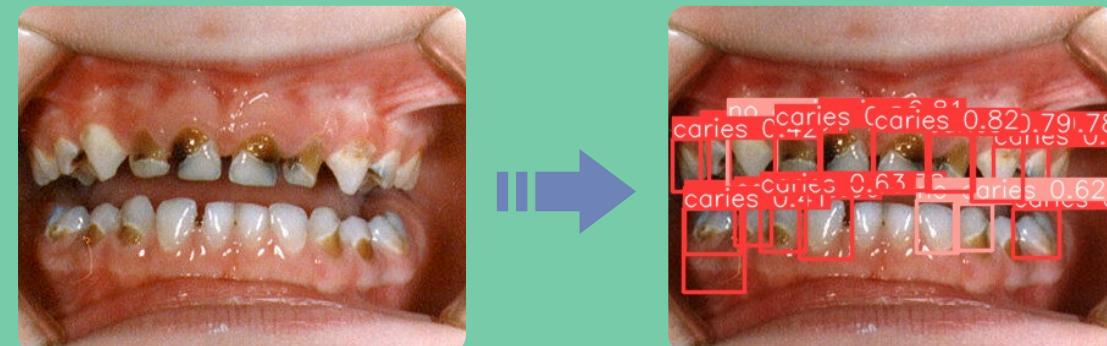
Bounding Box & Classification Loss: Gradual decrease over epochs, indicating improved regression accuracy & object classification.

Precision: Shows inconsistencies but trends upward, reflecting better positive predictions.

Recall: Initially fluctuates, then stabilizes with an upward trend, indicating better retrieval of actual positives.

mAP at IoU 50: Generally rising, signifying improvement in object detection accuracy at a specific IoU threshold.

mAP at IoU 50-95: Demonstrates a consistent upward trend, showcasing enhancements across various IoU thresholds.



Up to 85% accuracy for detecting Caries & up to 70% for No-Caries.

Conclusion & Future Work

In conclusion, the dental caries detection app will play a significant role in detecting caries in Early Stage and increasing awareness of Dental issues.

Future enhancements will focus on refining model accuracy, improving the user interface, and integrating real-time data for better diagnosis.



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