

Vivekanand Education Society's Institute of Technology



Department of Computer Engineering

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Project Synopsis Template (2024-25) - Sem VII

ToothBuddy: Remote Dental Diagnostic and Consultation System

Mannat Doultani

Asst. Professor, Computer Engineering

Mohit Patil

2021.mohit.patil@ves.ac.in

Mahendra Girase

2021.mahendra.girase@ves.ac.in

Pranav Rane

2021.pranav.rane@ves.ac.in

Amisha Chandwani

2021.amisha.chandwani@ves.ac.in

Abstract: This project aims to develop a machine learning (ML)-based system for detecting external dental problems through image analysis. The system will utilize image processing techniques to identify common dental issues such as swollen gums, yellow teeth, and cavities, etc. Once detected, the system will provide users with basic treatment plans and recommendations, along with guidance for seeking professional dental consultation.

Introduction: Oral health is a critical aspect of overall well-being, yet it is often overlooked until severe issues arise. Timely detection and intervention can prevent many oral diseases from progressing into more serious conditions. However, access to dental care and regular check-ups is not always feasible for everyone.

In response to this challenge, we are developing a cutting-edge application designed to detect externally visible oral diseases using images. Leveraging advanced machine learning techniques, our application will classify and identify common oral health issues based on visual input. This tool aims to empower users with early detection capabilities, allowing for timely intervention and better oral health management, even in areas where dental resources are limited.

Problem Statement: Untreated oral diseases can result in serious health complications and reduced quality of life. However, many individuals face geographic, financial, or awareness barriers that limit their access to regular dental care. Current detection methods often require in-person exams by dental professionals, which are not feasible for everyone. To bridge this gap, this project proposes the development of an AI-powered application capable of detecting visible oral diseases using images. This app will empower users to self-assess their oral health, facilitating early diagnosis and timely treatment. By making dental assessments more accessible, the app aims to improve overall oral health outcomes.

Proposed Solution: To address the critical need for early detection and accessibility in oral healthcare, we propose the development of an application that enables users to detect externally visible oral diseases through image analysis. The application will utilize advanced machine learning algorithms to classify and identify common oral health issues based on images captured by the user's device.

The key features of the proposed solution include:

- **AI-Powered Image Analysis:** The application will be powered by a robust machine learning model trained on a diverse dataset of oral health images. This model will perform real-time classification of the captured images, identifying potential oral diseases with high accuracy.

- **Instant Results and Recommendations:** Upon analysis, the application will provide users with instant feedback on their oral health, including a detailed report of any detected issues. It will also offer personalized recommendations for further action, such as seeking professional dental care if necessary.

Methodology / Block Diagram

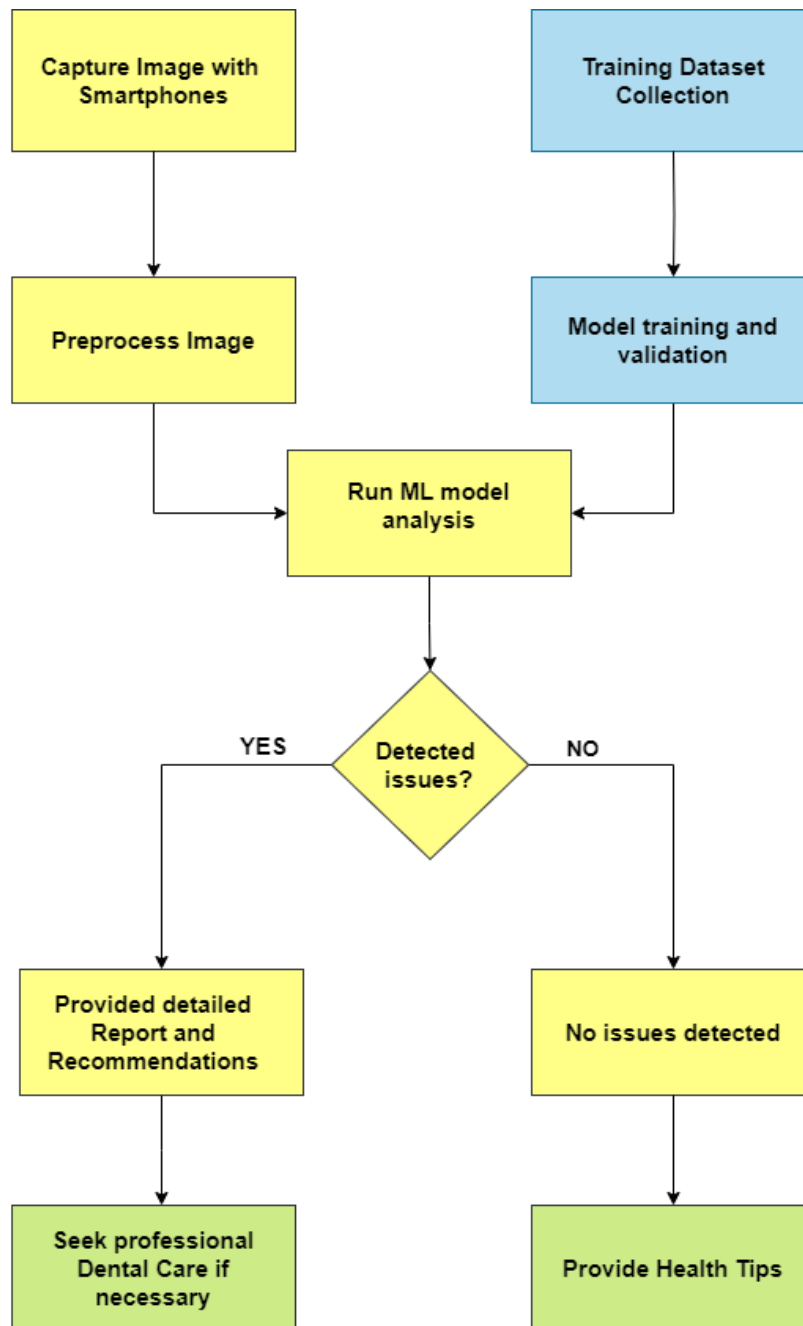


Fig: Block Diagram of Remote Dental Diagnostic and Consultation System

Hardware , Software and tools Requirements:

Hardware : User Device(Camera)

Software: IDE, Python(TensorFlow/PyTorch, OpenCV, Keras, scikit-learn)

Proposed Evaluation Measures:

- Accuracy of Disease Detection:
Measure the correctness of the model in identifying oral diseases from images. A high accuracy rate indicates that the app reliably distinguishes between different conditions.
- Processing Time:
Evaluate the time taken by the application to analyze an image and generate results. Faster processing enhances user experience and ensures timely feedback.
- Model Robustness:
Test the model's ability to perform consistently across diverse image qualities and lighting conditions. Robustness ensures that the application functions effectively in various real-world scenarios.

Conclusion: The development of an application for detecting externally visible oral diseases represents a significant advancement in accessible healthcare. By leveraging machine learning and image analysis, this application empowers users to take proactive steps in managing their oral health, potentially reducing the burden of untreated dental conditions. Our project not only addresses the pressing need for early detection but also contributes to the broader goal of improving overall health outcomes through innovative technology. With continued refinement and user feedback, this application has the potential to become a valuable tool in preventive healthcare, making oral health assessments more accessible and efficient for everyone.

References:

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