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OREL HEALTH DISEASE DETECTION

Arunakumara GR[1], Dr. Md. Irshad Hussan B[2]

[1]P.G, Student Department Of Master Of Computer Applications, University BDT College Of Engineering, Davangere, Karnataka, India.

[2]Assistant Professor, Department Of Master Of Computer Applications, University BDT College Of Engineering Davangere, Karnataka, India.

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ABSTRACT

The proposed system, called AI-Powered Oral Health Disease Detection, uses advanced deep learning and computer vision to automatically spot common oral diseases from dental images. This offers a quicker and easier way for early diagnosis and prevention.

Oral health is key to overall well-being, but many people delay going to the dentist because of cost, lack of awareness, or limited access, which can let problems get worse over time. Our project tackles this issue by using smart machine learning models like Convolutional Neural Networks (CNN), VGG16, ResNet, MobileNetV2, and EfficientNet to identify various oral diseases such as calculus, dental caries, gingivitis, mouth ulcers, tooth discoloration, and hypodontia.

Keywords: Oral Health, Oral Disease Detection, Oral Diagnosis, Oral Cancer Detection.

1. INTRODUCTION

Oral health is a big part of our overall well-being, but it's something many of us tend to ignore until a problem becomes too painful to ignore. Common oral diseases such as dental caries, gingivitis, mouth ulcers, tooth discoloration, calculus, and hypodontia not only affect Good oral hygiene doesn't just keep your smile looking great it can also help prevent serious health issues down the line lead to serious health complications if left untreated.

Traditional diagnosis requires physical examination by dental Many people rely on dental professionals for help, but those visits may not always happen until things get really bad or painful. be accessible or affordable to everyone. To address this challenge, the advancement of artificial intelligence (AI) in healthcare has opened new opportunities for early detection and prevention of oral diseases.

2. LITERATURE SURVEY

The existing systems for oral health disease detection are mostly dependent on traditional clinical examinations carried out by dental professionals using visual inspection and radiographs.

The proposed system introduces an AI-powered deep learning approach for automated oral disease detection using advanced models such as CNN, MobileNetV2, ResNet, EfficientNet, and VGG16. Users can register, log in, and upload oral images via a web-based interface developed with HTML, CSS, and JavaScript.

3. METHODOLOGY

Our approach to detecting oral diseases combines smart to deliver accurate results. It starts with users creating an account and logging in to keep everything secure.

Once logged in, users can upload pictures of their oral cavity. These images go through a cleanup process like reducing noise and enhancing quality to make sure they're clear and ready for analysis. We also expand and extract key features from the images to build a stronger dataset. Finally,

4. IMPLEMENTATION

Pre-processing is an essential stage in developing the AI-powered oral disease detection system, as it ensures that raw input images are standardized and suitable for accurate model training. Since oral The images might come from various devices, lighting conditions, and angles, the first step involves cleaning and organizing the dataset. This includes maintaining consistent file naming, storing metadata such as acquisition date and device type, and ensuring that annotations (like disease labels) follow a uniform format.

Low-quality images that are blurred, overexposed, or incomplete are filtered out to avoid misleading the model. Such filtering can be performed both automatically, using metrics like variance of Laplacian for blur detection, and manually through expert review when necessary.

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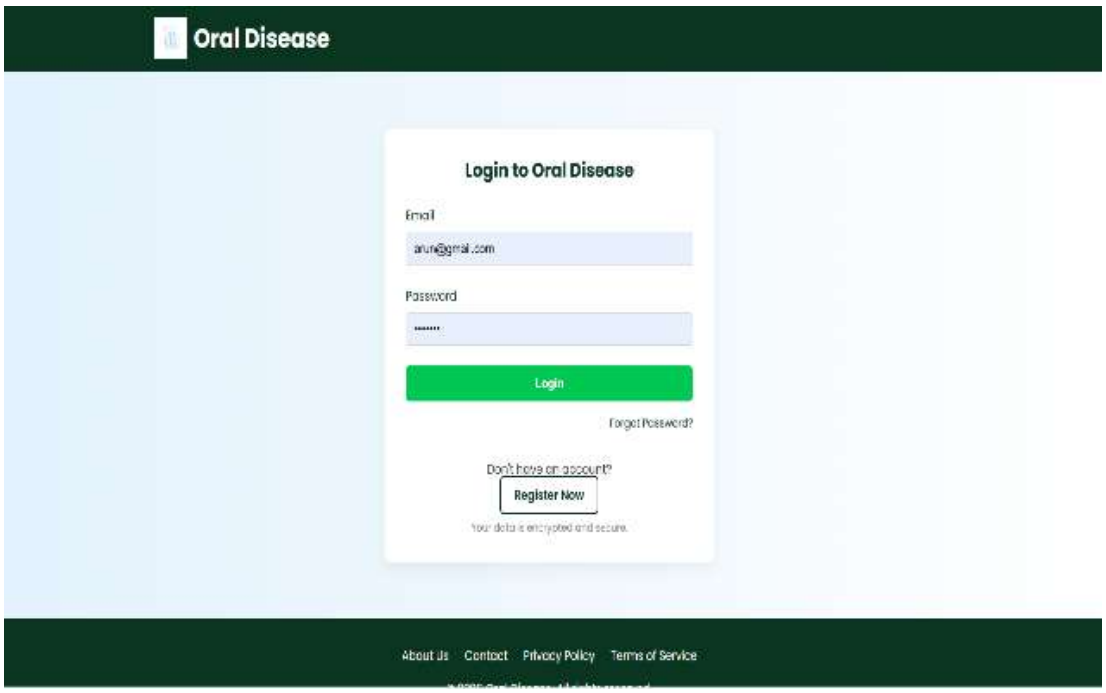
5. RESULTS AND DISCUSSION



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6. CONCLUSION

The AI-powered oral health disease detection system demonstrates the potential of artificial intelligence and deep learning to transform the way oral diseases are diagnosed and managed. By leveraging CNN architectures and pre-trained models such as VGG16, ResNet, and MobileNetV2, the system can accurately classify common dental issues including calculus, dental caries, gingivitis, mouth ulcers, tooth discoloration, and hypodontia. The integration of a Flask-based backend with a user-friendly frontend allows patients to upload oral images and instantly receive results, treatment suggestions, and personalized preventive tips This helps make sure users not only know about. their condition but also guided towards maintaining better oral health. Furthermore, the system provides support to dental professionals by serving as a preliminary diagnostic aid, reducing the risk of overlooked conditions and supporting early intervention. Overall, this project highlights how AI-driven solutions can contribute significantly to accessible, efficient, and reliable healthcare systems in dentistry.

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