

# A Novel Approach for Automatic Oral Disease Detection Through the Help of Artificial Intelligence

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## Abstract

This paper aims to provide a new model that can be used within the field of computer assisted medical imaging. The main focus will be on artificial intelligence (AI) in concordance with oral diseases and how domain specialized as well as normal oral cavity pictures can further help doctors automatically determine patients prospects and premeditate dangerous diseases. Traditional diagnostic approaches often pose challenges in terms of accessibility, cost, and time, hindering timely intervention and exacerbating the impact of oral health issues. The introduction of AI into the medical field not only addresses these shortcomings but also opens up new avenues for enhanced precision and objectivity in diagnostics. By leveraging machine learning algorithms and pattern recognition, AI has the potential to revolutionize the accuracy and efficiency of disease detection, providing a valuable tool for healthcare professionals.

Two of the main problems that can be subtracted from our daily lives is the lack of care for oral health from patients as well as the unavailability of good services. This can be both fixed by providing a remote way of being diagnosed automatically. Most of the already proposed approaches are based on multiple types of pre-trained Convolutional Neural Networks models like VGG16, GoogLeNet Inception v3, DenseNet121, ResNet50, DarkNet53, etc., as well as the provision of labeled datasets. The datasets being used contain either clinically taken images like x-ray, radiographs, hyperspectral images or normal images that can be taken with any kind of camera, that had been labeled by medical specialists of the given domain. The main problem described within the paper will be that of Tonsil stones. Due to the common affected area of the oral cavity we will propose multiple multi-label classification models as well as describe the way we managed to collect data for training. As for the model we are currently experimenting with various pretrained models as well as attempting to build one from scratch. The dataset use for training currently contains 329 publicly available photos of the oral cavity that were labeled with the help of students from Victor Babeș University of Medicine. We expect to further enhance this number by applying GAAN and other data augmentation techniques. In the end we expect to have a model with accuracy greater than 90% that can detect tonsil stones, pharyngitis, tonsillitis and gastric reflux and have a demo of its functionality by hosting the model online and providing a mobile application for testing.

**Keywords:** Oral diseases; Convolutional Neural Networks; Tonsil Stones; Data Augmentation

