

XERXEZ SOLUTIONS
DEVELOPMENT – TRAINING – RESEARCH

Project Name: Teeth AI - Teeth Disease Prediction System Using Big Data, Machine Learning, Chatbot, Microservices and Generative AI

ABSTRACT: Dental radiography is crucial for diagnosis, treatment, and quality assessment in dentistry. To enhance clinical quality, digitalized dental X-ray image analysis systems have been developed. In this study, we preprocess a dataset of dental X-ray images and evaluate treatment quality using these images. Our aim is to propose an automated clinical quality evaluation tool to aid dentists in making decisions. We employ deep learning, a form of artificial intelligence, to detect diseases in X-ray images. The dataset consists of 126 images, labeled as Normal or Affected by dental experts. Data augmentation is applied to increase the dataset size for effective training of deep learning models. A Convolutional Neural Network (CNN) architecture is constructed, comprising convolutional, max pooling, flattened, dense, and output layers, to classify the images as Normal or Affected. The CNN model is trained on the augmented dataset to automate clinical quality evaluation. The model's performance is evaluated based on metrics such as accuracy, loss, precision, recall, and F1-score. Our method achieves an accuracy of 97.87% and an F1-score of 60%, demonstrating comparable performance to expert dentists and radiologists.

INTRODUCTION: In routine clinical practice, the examination of dental radiographs is a crucial step in the diagnosing process. The reason for this is that throughout the diagnosis procedure, the dentist must analyze a variety of dental issues, including tooth counts and associated disorders. Since the dental image dataset is small, data collection is the main challenge for working on a medical image. Getting most researchers to focus on definitive tasks, such as filtering, segmentation, and feature selection, is significantly more challenging. In this, we will develop a classification model that classifies X-ray pictures into two classes. This classification will be done by using a convolutional neural network (CNN) that can perform multiple tasks of classification. The convolutional neural networks used in this study are represented by a model with varying numbers of activation functions, dropout layers, and max-pooling layers. An improved and pre-processed version of the data will be used before a multioutput model is constructed. Finally, the model will be assembled and trained; loss and accuracy curves are utilized as

evaluation criteria for the model analysis. Prior knowledge of several jobs is required for the segmentation and identification of dental caries to be done more easily. Understanding the different parts of the tooth and the precise location of the lesion on the tooth is important. Understanding the several dental image types that will be used, such as panoramic or bitewing radiographs, is also necessary. To select the best approach for segmenting and detecting caries, it is also necessary to clearly define the exact sections or areas of interest that must be considered. To achieve high-performance segmentation and identification of dental caries, all of this information is necessary. To achieve high-performance segmentation and identification of dental caries, all this information is necessary.

RELATED WORK & EXISTING PROBLEM:

The following section provides a thorough assessment of the literature on current methods for creating Deep learning frameworks for the identification of many dental illnesses. The previous section's evaluation criteria are provided simply as general guidelines. We discuss current classification techniques for dental disease diagnosis. Three general categories can be used to classify these techniques: 1) Semi-automatic procedures the framework of the categorization scheme, along with statistical classifiers based on machine learning (ML) and the classification models based on deep learning (DL).

In a new framework for the detection of dental disease from an image dataset is proposed in which a CNN is constructed. A NASNet model representing the convolutional neural networks utilized in this study has various amounts of layers with maxpooling, activation functions and dropout layers. An enhanced and preprocessed version of the data will be used before a multioutput model is constructed. A then the model will be assembled and trained; loss and accuracy curves are utilized as evaluation criteria for the model analysis. The model beat other existing algorithms by achieving an accuracy of more than 96 percent. A total of 116 patients' anonymous, deidentified panoramic dental X-ray scans made up the dental image dataset, which was obtained from the Noor Medical Imaging Center in Qom, Iran.

A new technique for the detection of dental disease is proposed by. In this proposed work order to determine the amount of periodontal alveolar bone loss as well as the precise location and shape of the alveolar bone loss, three skilled periodontists highlighted important locations on a total of 640 panoramic photographs. A two-

phase deep learning architecture made up of UNet and YOLO-v4 was created in order to accurately calculate the percentage of periodontal bone loss in alveolars and stage periodontitis. The model's ability to recognize these characteristics was evaluated and compared to dentists in general. With an overall classification accuracy of 0.77, the model performed differently for various tooth placements and categories; in general, the model's categorization was more accurate than that of general practitioners. Conclusions: Radiographic periodontal alveolar staging and assessment can be done using a deep learning model.

TECHNOLOGY WE COVER:

1. Python Programming
2. Machine Learning/Deep Learning/Segmentations
3. Django – Front End
4. PostgreSQL – Database
5. MLOps using MLFlow – Model Orchestration
6. Github Action - CI/CD Pipeline
7. DVC for Data Tracking
8. DagsHub
9. Docker and Kubernetes

OUR OFFERING:

1. Complete Implementation of Project
2. Training and Project Deployment on local system
3. Project Completion Certificate
4. Paper Publication in IJera International
5. Project Report
6. Xerxez T-Shirts

DISCLOSURE:

1. Students must prepare the PPT for demonstration.
2. 50% Advance and 50% during project submission.
3. Once Payment is done, cannot be refundable.

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