JP INFOTECH

OUR PROPOSED PROJECT TITLE:

Oral Cancer Detection using Deep Learning

IEEE BASE PAPER TITLE:

Classification of Oral Cancer Into Pre-Cancerous Stages From White Light Images Using LightGBM Algorithm

IEEE BASE PAPER ABSTRACT:

Cancer is one of the foremost reasons for death worldwide, with nearly 10 million deaths noted in 2020. Globally, oral cancer ranks sixth when compared to other cancers. It is lethal because most cases are noticed at advanced stages, which can be prevented if screened for or treated early in the pre-cancerous stages, successively leading to a significant decrease in the mortality rate. In this work, a method is proposed that can effectively differentiate between benign and malignant oral cavity lesions and also classify their pre-cancerous stages. The method involves exploring five distinct color spaces and extracting color and texture features, which are then classified using a machine learning technique called Light Gradient Boosting Machine (LightGBM). The overall performance is promising, outperforming the state-of-art methods for the task of oral cancer classification, with a testing accuracy of 99.25%, precision of 99.18%, recall of 99.31%, f1-score of 99.24% and specificity of 99.31% for the binary classification, and testing accuracy of 98.88%, precision of 98.86%, recall of 97.92%, f1-score of 98.38% and specificity of 99.03% for multi-class classification. The proposed method used

hand-crafted features and a machine-learning classifier, which uses limited resources and is less time-consuming.

OUR PROPOSED ABSTRACT:

Oral cancer is a significant public health concern globally, with early detection playing a crucial role in improving patient outcomes. In this project, we propose a novel approach for oral cancer detection leveraging deep learning techniques. The system is developed using Python as the primary coding language, with Flask serving as the web framework and HTML, CSS, and JavaScript for the frontend interface.

Two state-of-the-art deep learning architectures, ResNet152V2 and MobileNet, are employed to classify oral images accurately. The ResNet152V2 model achieves impressive training accuracy of 98.00% and validation accuracy of 93.00%, while the MobileNet model achieves a training accuracy of 97.00% and validation accuracy of 92.00%.

The dataset utilized in this project comprises 500 oral cancer images and 250 non-cancer oral images, meticulously labeled for easy classification. This dataset serves as a comprehensive resource for researchers and developers in the field of oral cancer detection using machine learning algorithms. With a balanced representation of cancerous and non-cancerous samples, this dataset facilitates the exploration of innovative approaches to enhance diagnostic accuracy.

Furthermore, the frontend interface developed using HTML, CSS, and JavaScript provides an intuitive platform for users to interact with the system, facilitating seamless integration into clinical workflows. Through this user-friendly interface, healthcare professionals can upload oral images for real-time classification, aiding in timely diagnosis and intervention.

Overall, this project presents a promising avenue for leveraging deep learning in oral cancer detection, offering a valuable tool for healthcare professionals in early detection and intervention, ultimately contributing to improved patient care and outcomes. The combination of advanced deep learning algorithms, a meticulously curated dataset, and an intuitive frontend interface establishes a robust framework for future research and development in the field of oral cancer detection.

SYSTEM REQUIREMENTS:

HARDWARE REQUIREMENTS:

- System : Pentium i3 Processor.
- Hard Disk : 500 GB.
- Monitor : 15'' LED.
- Input Devices : Keyboard, Mouse.
- Ram : 8 GB.

SOFTWARE REQUIREMENTS:

- Operating System : Windows 10 / 11.
- Coding Language : Python 3.10.9.
- Web Framework : Flask.
- Frontend : HTML, CSS, JavaScript.

REFERENCE:

BIBEK GOSWAMI, M. K. BHUYAN, (Senior Member, IEEE), SULTAN ALFARHOOD, AND MEJDL SAFRAN, "Classification of Oral Cancer Into Pre-Cancerous Stages From White Light Images Using LightGBM Algorithm", IEEE ACCESS, VOLUME 12, 2024.