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DetectOC: Deep Learning-Based Decision Support System for type of Oral Cancer Grading

Key Words – Deep Learning, Histopathology Images, OSCC Grading

A dissertation by

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ABSTRACT

Oral Squamous Cell Carcinoma (OSCC) is a common type of mouth cancer that presents difficulties in detecting it at an early stage and correctly identifying its type. This research project addresses the problem of OSCC classification using advanced data science techniques. The importance of accurately identifying cancerous and non-cancerous cells in oral tissue samples is emphasized, considering the potential impact on timely diagnosis and effective treatment. The limitations of existing classification methods and the need for an improved approach are discussed.

The EfficientNet architecture, a highly advanced Convolutional Neural Network (CNN), is used to classify OSCC. The pre-trained EfficientNet model is fine-tuned and adapted specifically to address the challenges of classifying oral tissue samples. Modifications and optimizations are made to the network architecture, such as adjusting the hyperparameters, adding or modifying layers, and fine-tuning the model's weights. These refinements enhance the network's ability to extract relevant features and capture the distinctive characteristics of OSCC cells, leading to improved accuracy and performance in the classification process.

Various data science metrics, such as accuracy, precision, recall, and F1-score, are utilized to evaluate the performance of the proposed CNN-based approach for OSCC classification. The test results demonstrate the model's ability to accurately differentiate between cancerous and non-cancerous oral tissue samples, highlighting its effectiveness. These results provide valuable insights and demonstrate the potential of the developed approach for aiding in clinical decision-making processes.

Keywords: Oral Squamous Cell Carcinoma, OSCC classification, Convolutional Neural Network, data science metrics, cancer diagnosis.

Subject Descriptors: Cancer classification, Image analysis, Deep learning, Data science, Oral pathology.