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Stroke Prediction using Retinal Fundus Image with Machine Learning

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Abstract: *Strokes are a leading cause of mortality and disability worldwide. Early prediction and identification of individuals at risk for stroke can significantly improve outcomes and reduce the burden on healthcare systems. In recent years, advances in machine learning techniques have shown promise in predicting stroke risk using various medical imaging modalities. This study focuses on the development of a retinal-based stroke prediction model using a Fast Recurrent Convolutional Neural Network (FRCNN) algorithm. The proposed FRCNN model leverages the unique characteristics of retinal images, which can serve as a window into the overall health of the cardiovascular system. By analyzing retinal images, potential markers and patterns associated with stroke risk can be identified. The model architecture consists of multiple convolutional and pooling layers followed by fully connected layers for classification. The FRCNN is trained on a large dataset of labeled retinal images, with corresponding stroke outcome information. To evaluate the performance of the developed model, a comprehensive set of experiments is conducted. The dataset is divided into training, validation, and testing sets, ensuring proper assessment of the model's generalization capabilities.*

Results indicate that the retinal-based stroke prediction model using the FRCNN algorithm achieves high accuracy in identifying individuals at risk for stroke. The model demonstrates strong discrimination power, as evidenced by high AUC-ROC values. Moreover, it exhibits good sensitivity and specificity, indicating its potential as a reliable screening tool for stroke risk assessment. The study also explores the underlying features learned by the FRCNN model through visualization techniques, providing insights into the retinal characteristics associated with stroke risk. This knowledge can contribute to the development of targeted interventions and treatments for stroke prevention.

Keywords: Retinal-based stroke prediction, FRCNN algorithm, Deep learning, Convolutional Neural Networks, Image analysis, Stroke risk assessment, Predictive modeling, Machine learning, Healthcare, Medical imaging, Feature extraction, Classification, Accuracy

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