Pneumonia Detection Using Deep Learning(Android)

Abstract

Pneumonia, a prevalent respiratory infection, poses significant health risks, particularly in vulnerable populations such as children and the elderly. Timely and accurate detection of pneumonia is crucial for effective treatment and improved patient outcomes. In this study, we propose a comprehensive approach to pneumonia detection utilizing deep learning techniques integrated within an Android application. The dataset utilized comprises a diverse collection of chest X-ray images, facilitating robust model training and validation.

The methodology employed in this study encompasses several key stages. Initial preprocessing of the dataset is conducted to standardize image resolutions, enhance data consistency, and prepare for deep learning model compatibility. Subsequently, data augmentation techniques are applied to augment the dataset, improving model generalization and robustness. The deep learning model utilized for pneumonia detection is tailored for medical image analysis, leveraging advanced architectures such as Convolutional Neural Networks (CNNs) or transfer learning approaches.

The trained model is seamlessly integrated into an Android application, providing users with a user-friendly interface to capture and upload chest X-ray images for real-time diagnostic predictions. The Android app leverages the device's camera functionality to enable users to capture images directly from their smartphones or tablets, enhancing accessibility and convenience for both medical professionals and patients. Upon image submission, the app communicates with the deep learning model to provide instantaneous prediction results to the user.

Key features of the Android application include seamless image capture and upload functionality, real-time prediction results, and visualization of diagnostic outcomes. Additionally, the app may offer educational resources on pneumonia prevention, symptoms, and treatment options to empower users with relevant information.

Performance evaluation metrics, including accuracy, sensitivity, specificity, and area under the receiver operating characteristic curve (AUC-ROC), validate the model's efficacy in accurately detecting pneumonia cases from chest X-ray images with high precision. The Android application's usability and performance are assessed through user feedback and testing, ensuring a seamless and intuitive user experience.

This research significantly advances medical imaging and healthcare technology by providing a practical solution for early detection of pneumonia using deep learning integrated with Android applications. By leveraging state-of-the-art deep learning techniques and mobile technology, this approach aims to enhance diagnostic accuracy and accessibility, ultimately leading to improved patient outcomes and prognosis for individuals affected by pneumonia.

In conclusion, the integration of deep learning models within Android applications represents a significant advancement in utilizing technology for medical diagnosis and treatment. This system holds promise for facilitating early detection and intervention for pneumonia, thereby contributing to efforts to combat this prevalent respiratory infection and improve patient care in respiratory medicine practice.