

ABSTRACT

Historically, diagnosing prevalent health conditions such as Diabetes, Alzheimer's, Skin Cancer, Lung Cancer, and Malaria has relied on invasive procedures that are often costly, time-consuming, and limited in accuracy. In response to these challenges, our project has leveraged advancements in machine learning (ML) and Convolutional Neural Networks (CNNs) to develop a comprehensive diagnostic model that addresses these diseases through non-invasive techniques. Utilizing distinct algorithms for each condition-such as the Random Forest Classifier for Diabetes and CNNs for Alzheimer's and Skin Cancer-our model aims to revolutionize diagnostic processes by incorporating diverse clinical data and imaging techniques, thus enhancing the accuracy and efficiency of disease diagnosis.

The methodology of our study involved the collection of high-quality data from Kaggle.com, followed by rigorous data cleaning and the application of pre-trained ML models tailored to specific diseases. The architecture of our system integrates TensorFlow and Keras to facilitate the swift deployment and evaluation of these models, ensuring high reliability in disease prediction. Our approach not only utilizes traditional ML techniques but also adapts to the latest in neural network architectures for image-based diagnostics, providing a robust framework for the precise identification of diseases across varied modalities.

The implementation of our diagnostic model across multiple medical datasets has demonstrated exceptional accuracy, notably achieving a 95.4% accuracy rate for Diabetes and up to 98% for Malaria. These results underline the model's capability to provide rapid, reliable, and user-friendly diagnostic assessments, which are crucial for integrating into existing clinical workflows. The potential of this model to significantly impact real-world healthcare practices is substantial, promising to enhance the speed and precision of medical diagnostics and thereby improve patient outcomes on a global scale.

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LIST OF SYMBOLS, ABBREVIATION AND NOMENCLATURE

Abbreviation	Full Form
ML	Machine Learning
CNN	Convolution Neural Network
AI	Artificial Intelligence
GDPR	General Data Protection Regulation
HIPAA	Health Insurance Portability and Accountability Act
MRI	Magnetic Resonance Imaging
AUC-ROC	Area Under the Receiver Operating Characteristic Curve
CT	Computed Tomography
OCR	Optical Character Recognition
BMI	Body Mass Index