Instant Health Scan

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Introduction

- Integrating technology in healthcare enhances patient care and drives cost-saving opportunities for stakeholders.
- A Profound understanding of data processing is crucial, facilitating rapid, precise analysis in medical diagnostics.
- Cutting-edge methods are revolutionizing medical diagnostics, achieving near-human accuracy in interpreting large medical images, from MRI's to X-rays.

Figure: Instant Health Scan

Literature Survey

S. No	Title of the paper	Author(s) & Journal Details	Description
1	Predicting disease from several symptoms using machine learning approach.	MD.Atikur Rahman,Tania Ahmed Nipa,Md. Assaduzzaman - 2023	In this paper, they have used algorithms e KNN (K-Nearest Neighbor) that is 98.37 and the lowest accuracy for NB (Naive Bayes) which was 97.76. Moreover, other models are DT, SVM, LR and RF Classifiers also the accuracy is accordingly 98.27, 98.17, 98.0, and 97.86).
2	Health Care Application using Machine Learning and Deep Learning	AjinkyaPadule, AmanPatel, ArsalanPatel,Aman Shaikh - 2022	In this paper, they have predicted 5 diseases: Diabetes(Random Forest - 84.01) Heart(SVM - 81.57) Liver(Random Forest - 83.33) Malaria(VGG16 - 94.29) Pneumonia (VGG16 - 95.48).

S. No	Title of the paper	Author(s) & Journal Details	Description
3	Prediction Of Diseases using Machine Learning	Vaibhav Kulkarni,Surwase,Kedar Pingale,Saurabh Sarage - 2020	The system utilizes machine learning with Naïve Bayes for disease prediction, KNN for classification, Logistic Regression for feature extraction, and Decision Trees for dataset partitioning.

Problem Statement

- Amidst COVID-19 disruptions, this project employs technology for accessible disease detection, addressing healthcare barriers caused by limited hospital access or online consultations.

Figure: Problem Statement

Proposed Method

- Developing a hybrid disease detection framework using machine learning and deep learning techniques to replace traditional doctor consultations, enabling faster and more accurate diagnoses for seven diverse diseases in the healthcare sector

Figure: Proposed method

Dataset

- The dataset preparation process includes collecting data from diverse sources and performing tasks such as labeling, resizing, splitting, and normalization to make it suitable for training..

MultiDisease Predictor Module	**Datasets**	**Proposed Algorithm**
Heart	UCI Dataset	XGBoost
Diabetes	PIMA Dataset	Random forest
Brain Tumor	Brain MRI Images	Conventional Neural Networks
Alzheimer	Alzheimer Dataset	Conventional Neural Networks
Pneumonia	Chest X-Ray	Conventional Neural Networks
Breast cancer	Brest Cancer	Random Forest
Covid-19	Covid Image	Conventional Neural Networks

Objectives

- **Project Scope:** The project aims to detect seven diseases using AI. It combines CNN for image analysis and classical machine learning algorithms like Random Forest and XGBoost.
- **CNN Architecture:** CNNs are used for image analysis, and they consist of convolution, pooling, ReLU, fully connected, and loss layers. These layers help in learning hierarchical features and recognizing distinctive patterns.
- **Random Forest:** A machine learning algorithm that combines multiple decision trees, offering both regression and classification. It generally outperforms single decision trees and reduces variance.

- **XGBoost Efficiency:** XGBoost is an efficient ensemble algorithm with a structured data focus. It uses a second-order Taylor approximation for enhanced efficiency and accuracy, benefiting from features like parallelization, cache block, tree pruning, and cross-validation.
- **Shift Invariance:** CNNs are not entirely translation-invariant due to downsampling operations.
- **Deep Learning:** The project involves deep learning, including ANN and DNN, with multiple layers for processing data, while CNNs are specifically used for image analysis.

Results

Figure: Homepage

Figure: Heart Disease Prediction

Figure: Covid Disease Prediction

Figure: Output

Figure: Brain Tumor Prediction

Figure: Output

Figure: Brest Cancer Prediction

Figure: Output

Figure: Alzheimer Disease Prediction

Figure: Output

Figure: Diabetes Disease Prediction

Figure: Output

Figure: Pneumonia Disease

Figure: Output

Conclusion

- In conclusion, this project effectively utilizes AI to detect seven diseases, merging CNNs for image analysis and classical ML algorithms (Random Forest and XGBoost). It provides a convenient, accurate, and efficient disease detection method, showcasing AI's prowess in medical diagnostics. The project's application of CNNs in image analysis and XGBoost for structured data underlines AI's versatility in healthcare, promising faster and more accessible disease detection, reducing report reliance and enhancing diagnostic

Future Scope

- **Expanded Disease Detection:** The project can be expanded to detect a broader spectrum of diseases and health conditions, including rare and complex disorders, enabling early diagnosis and treatment.
- **AI Explainability:** Enhancing the interpretability and transparency of AI models, making their decision-making processes more understandable to healthcare professionals and patients, thus building trust and facilitating acceptance.

Thank you