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PredictaHealth : Smart Disease Prediction and Medical Report Analysis

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Abstract: *The proposed system is an AI-driven disease prediction and healthcare assistance platform designed to help users identify potential illnesses and access relevant medical support efficiently. The system allows users to register and log in to input their symptoms, which can be processed in multiple languages. Using machine learning-based disease detection, the system predicts possible diseases and provides users with valuable suggestions such as nearby hospitals, YouTube health-related videos, and scheduling of medical reminders or alarms.*

Additionally, the system maintains a record history that enables users to match and analyze their previous reports for better health tracking. On the administrative side, healthcare providers or system administrators can log in to add hospitals, view registered users, and manage the healthcare database. By integrating intelligent disease detection with location-based services and user history management, the proposed system enhances accessibility, accuracy, and personalization in healthcare support.The rapid advancement of Machine Learning (ML) and Deep Learning (DL) technologies has significantly transformed the healthcare sector, particularly in disease prediction and diagnosis. This study presents a comprehensive review of ML and DL applications across sixteen major diseases, synthesizing research findings published between 2015 and 2024. It examines various methodologies, performance outcomes, and clinical impacts to highlight the transformative role of these technologies in modern healthcare..

Keywords: Disease Prediction System, Healthcare Automation, Machine Learning, Symptom Analysis, Language Support, Hospital Recommendation, Report History Matching, Alarm Scheduling, AI-based Diagnosis, Health Monitoring System, Patient Assistance, Medical Data Management

I. INTRODUCTION

In recent years, the integration of Artificial Intelligence (AI) and Machine Learning (ML) into healthcare has led to the development of intelligent systems that enhance disease prediction, diagnosis, and patient support. The proposed system aims to assist users in identifying potential health issues based on their symptoms while providing additional features such as hospital recommendations, report history tracking, alarm scheduling, and informative health resources[1].

The system architecture consists of two main modules: the User Module and the Admin Module, connected through a central intelligent System Module. The User Module allows individuals to register, log in, and input their symptoms in multiple languages, enabling accessibility for a diverse audience[2]. The system then analyzes the input using AI algorithms to detect possible diseases and provide appropriate suggestions. It also helps users locate the nearest hospitals, set reminders for medication or checkups, and access health-related YouTube videos for better understanding of their condition.

On the other hand, the Admin Module facilitates hospital management by allowing administrators to log in, add hospital details, and view registered users [3]. This ensures that the healthcare database remains accurate and up-to-date. The System Module acts as the core intelligence unit, processing data, executing disease detection algorithms, and managing communication between users and administrators.

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By combining AI-based disease detection with multilingual support and real-time hospital recommendations, the proposed system enhances accessibility, accuracy, and personalization in healthcare services. It not only empowers users to make informed health decisions but also supports medical professionals by maintaining an organized digital healthcare ecosystem [5].

By integrating Artificial Intelligence (AI), Machine Learning (ML), and location-based services, the system functions as a unified healthcare platform that bridges the gap between patients and medical professionals. The AI component is responsible for analyzing user-input symptoms, learning from historical health data, and generating accurate disease predictions using trained models. The Machine Learning algorithms continuously improve their performance through exposure to diverse datasets, ensuring that predictions remain relevant and precise across a wide range of diseases [6].

II. BACKGROUND

Additionally, the system incorporates geo-tagging technology to recommend nearby hospitals, clinics, or healthcare centers, helping users find immediate assistance during emergencies or health concerns. The inclusion of personalized reminders and alarm scheduling ensures that users remain consistent with their medication, follow-up visits, or diagnostic checkups, thereby promoting better health management. The report history tracking feature allows users to upload, store, and compare their past medical reports, enabling them to monitor progress over time and identify recurring health patterns.

Furthermore, the system includes a health education module that provides access to verified online resources and informative YouTube videos, enhancing user awareness about diseases, preventive care, and healthy lifestyle practices. This promotes a more informed approach to healthcare, encouraging users to adopt preventive habits rather than seeking treatment only after symptoms worsen.

Ultimately, the proposed system seeks to create a comprehensive, intelligent, and user-friendly healthcare ecosystem that ensures timely diagnosis, effective guidance, and improved accessibility to healthcare resources. It not only benefits individuals by providing instant medical insights but also supports healthcare providers by maintaining organized, digitized, and accessible patient data. Through its multi-faceted design, the system contributes toward achieving the broader goal of smart, AI-driven healthcare for all, fostering early disease detection, improved patient engagement, and a data-driven approach to health management.

Authored by PremanandGhadekar and Anita Dombale (March 2024), this paper presents a systematic analysis of AI-based methods for early disease detection, focusing on machine learning, deep learning, and hybrid approaches. It synthesizes findings from various reviews to highlight challenges such as data imbalance, privacy, and explainability. The study also proposes mitigation strategies and a roadmap for future AI healthcare research.

Written by K. Patel and R. Sharma (2023), this research implements supervised machine learning algorithms such as Decision Tree, Random Forest, and SVM for disease prediction. Using real-world medical datasets, the study emphasizes model performance, accuracy optimization, and comparative analysis. Its key limitation is dependency on structured datasets and limited adaptability to dynamic symptom variations.

Proposed by S. Chakraborty, H. Paul, S. Ghatak, S. K. Pandey, A. Kumar, K. Udham Singh, and M. A. Shah (2022), this IEEE Access paper develops an intelligent chatbot capable of predicting infectious diseases through user interaction. The system integrates NLP for symptom analysis and machine learning for prediction, ensuring real-time, conversational health assistance. Its main drawback is the limited multilingual capability and need for extensive training data

III. OBJECTIVE OF SYSTEM

The objective is to identify patterns in the language of individuals with depression by comparing their vocabulary to that of healthy users. However, this approach limitations, particularly due to the substantial overlap in the vocabulary used by both groups, making precise differentiation challenging

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- To develop a Smart system that predicts possible diseases based on user symptoms.
- To analyze medical reports and generate easy-to-understand health summaries.
- To assist users with personalized health tips, diet, and exercise recommendations.
- To integrate location-based services for finding nearby hospitals and doctors.

IV. PROPOSED SYSTEM

The proposed system is an ML-based healthcare application that allows users to predict diseases and analyses medical reports efficiently.

The system works in two main ways:

Symptom-Based Disease Prediction

Users enter their symptoms through the application. The system processes these inputs using machine learning algorithms (Random Forest) and predicts possible diseases.

Medical Report Analysis

Users can upload medical reports in image or PDF format. The system uses OCR (Optical Character Recognition) to extract text from the report. Important health parameters such as blood pressure, sugar level, and cholesterol are identified and analyzed to determine the risk level.

SYSTEM ARCHITECTURE

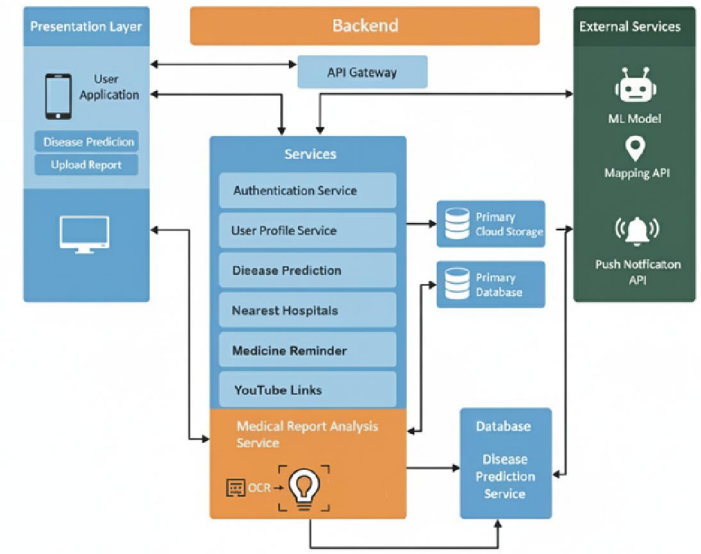

Fig 1. System Architecture

The system architecture diagram provides a complete overview of how the PredictaHealth system works.

It includes three main parts — Presentation Layer, Backend Services, and External Services.

The presentation layer allows users to interact through a web or mobile app where they can upload reports and check disease predictions.

The backend layer contains multiple services like Authentication, User Profile, Disease Prediction, Nearest Hospital Locator, Medicine Reminder, and YouTube Link Service. These services communicate through an API Gateway for smooth and secure data flow.

The User provides input such as registration details, login credentials, and symptoms to the Disease Prediction & Hospital Suggestion System. The system processes this data to predict diseases, find nearby hospitals, and send alerts back to the user. On the other hand, the Admin interacts with the system to manage hospital information, user records,

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and alarm details. The admin can also update or add new hospitals to the system. All this data exchange ensures accurate results and smooth communication between components. This diagram helps understand the overall data flow and how information is exchanged securely between the user, admin, and core system in real time

V. METHODOLOGY

The proposed PredictaHealth system follows a modular and systematic approach integrating Machi- n Learning OCR, and scheduling techniques. The system is divided into three major module Disease Prediction Module, Medical Report Analysis Module, and Alarm Scheduler Module . Each module, utilizes specific algorithms and techniques to ensure accuracy, efficiency, and usability.

Disease Prediction Module

Working Process:

- User inputs symptoms through the interface
- Input data is preprocessed (cleaning, encoding)
- Features are passed to the Machine Learning model
- Model predicts the most probable disease

Algorithm Used:

- Random Forest Algorithm (Supervised Learning)
- Ensemble method using multiple decision trees
- Uses bagging (Bootstrap Aggregation)
- Final prediction based on majority voting

Algorithm Steps (Point-wise):

- Collect dataset (Symptoms + Disease labels)
- Preprocess data (cleaning, encoding)
- Select number of trees (N)

For each tree:

- Create bootstrap sample from dataset
- Select random subset of features
- Build decision tree
- Repeat for all N trees (create forest)
- Input new symptoms
- Pass input to all trees
- Collect predictions from each tree
- Apply majority voting
- Output final predicted disease

Techniques Used:

- Feature Encoding (symptom to numerical format)
- Data Preprocessing (handling missing values)
- Ensemble Learning
- Classification Technique

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Features:

- Disease Prediction
- Nearby Hospital Recommendation (Geo-location API)
- YouTube Links (Content-based recommendation)
- Precaution Suggestions (Rule-based system)

Medical Report Analysis Module

Working Process:

- User uploads report (image/PDF)
- OCR extracts text from the document
- Extracted data is cleaned and structured
- Values are compared with standard ranges
- Risk level is generated

Algorithm Used:

- OCR Algorithm (Tesseract OCR / Image Processing)
- Rule-Based Classification Algorithm (for risk detection)

Techniques Used:

- Image Processing (for report clarity)
- Text Extraction (OCR)
- Data Parsing and Pattern Matching
- Threshold-Based Analysis
- Rule-Based Decision System

Features:

- Report Analysis (automatic parameter extraction)
- Risk Level Detection (Low / Medium / High)
- Do's and Don'ts Suggestions
- Personalized Health Insights

Alarm Scheduler Module

Working Process:

- User sets alarm details (time, medicine, frequency)
- Data is stored in database
- System continuously checks scheduled time
- Notification is triggered

Algorithm Used:

- Time-Based Scheduling Algorithm
- Event-Driven Programming Model

Techniques Used:

- Timestamp Comparison
- Background Task Execution
- Notification Trigger System

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- Database Scheduling

Features:

- Medicine Reminder
- Health Checkup Alerts
- Previous Alarm History Tracking

Integrated System Flow and Technologies

- Machine Learning Model → Disease Prediction
- OCR Engine → Report Analysis
- Location API → Hospital Recommendation
- Database System → Data storage and history
- Backend APIs → Communication between modules

Final Methodology Conclusion:

The proposed methodology combines Machine Learning (Random Forest), OCR-based text extract- ion ,and rule-based decision techniques within a modular architecture.This integrated approach enables accurate disease prediction, automated medical report interpretation, and effective health mana agreement through reminders, thereby creating a comprehensive and intelligent healthcare assistances system.

VI. RESULT

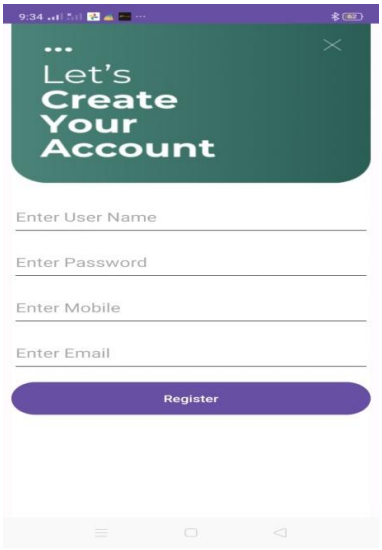

Fig.2 Create Account
Here user can create account to use system

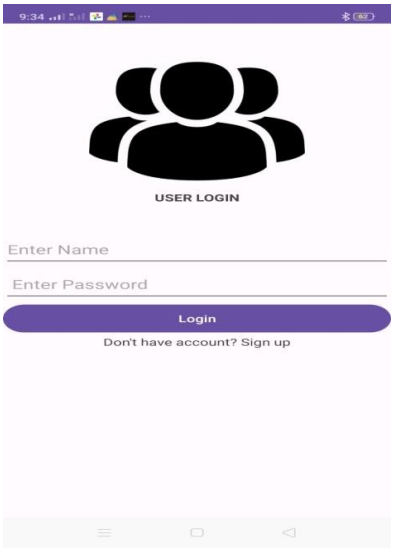

Fig. 2 Login After create account user can access system

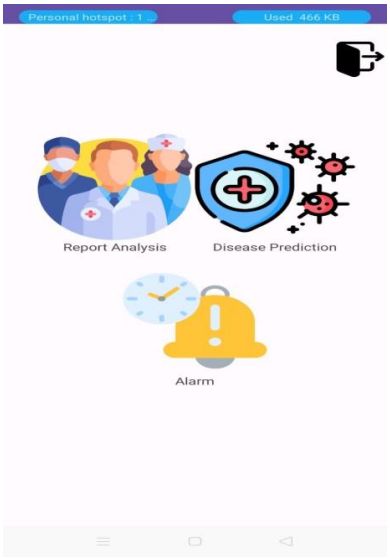

Fig 3.User Dashboard-This is dashboard so user can access one of each functionality

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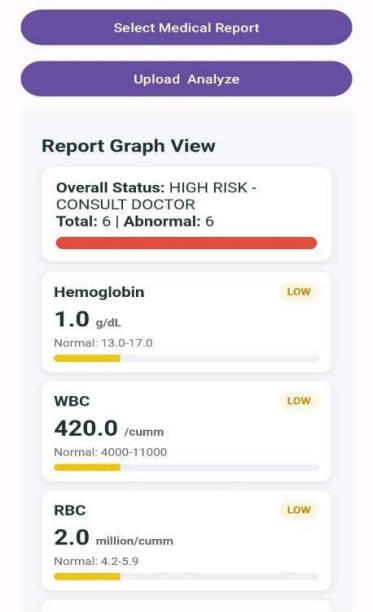

Fig.4 Report Analysis-Thisis where user can Upload Report for further analysis and check risk level in medical report

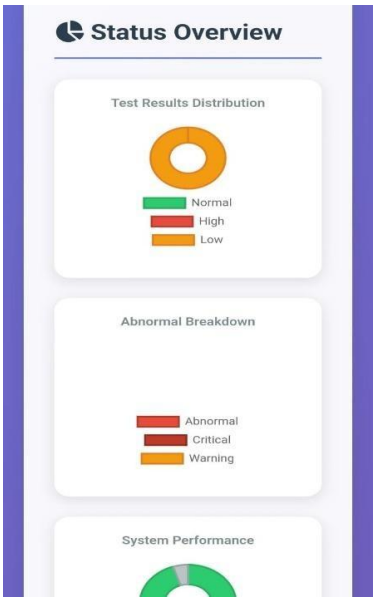

Fig. 5 Report Analysis Result- This is Overview of medical report analyzed.

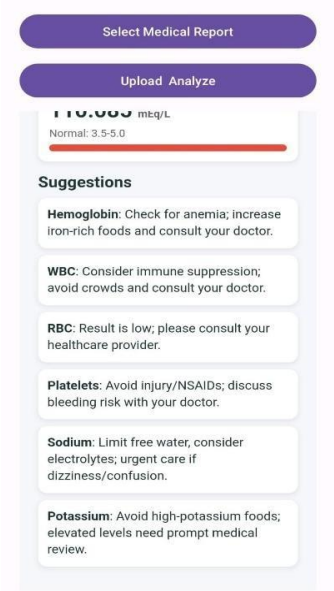

Fig. 6 Report Analysis Result- These are the suggestions according to Report Analyzed

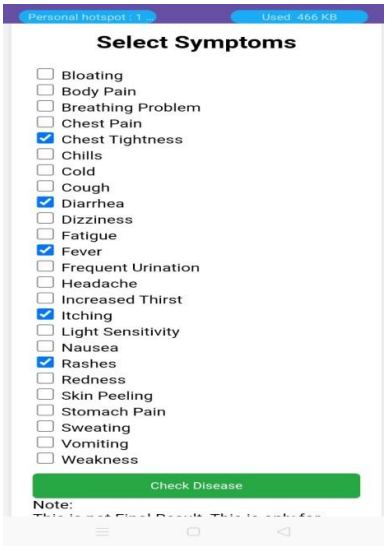

Fig.7 Disease Prediction By Symptoms-This disease prediction module here user can predict disease using symptoms

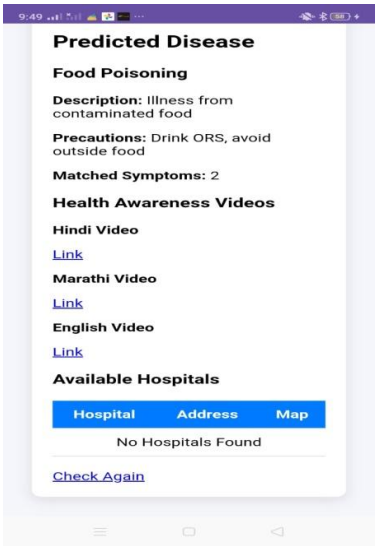

Fig.8 Result Prediction Description, Precautions, nearby hospitals and related Youtube links according to the Disease Predicted.

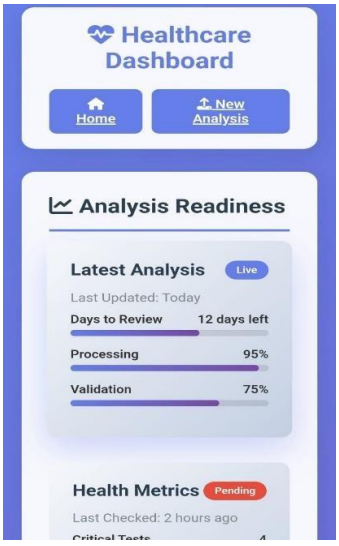

Fig.9 Report Analysis Using Image File

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VII. CONCLUSION

The proposed intelligent healthcare assistance application serves as a unified platform that bridges the gap between patients and healthcare providers. By leveraging machine learning for symptom-based disease detection, the system empowers users to identify potential health issues at an early stage and make informed decisions. Additionally, the integration of hospital information access, health resources, and personal health management tools—such as scheduling alarms and maintaining medical records—enhances user convenience and promotes preventive healthcare practices. For administrators, the system provides a robust framework to manage hospital data and user details efficiently. Overall, this application contributes toward a smarter, more accessible, and patient-centric healthcare ecosystem that improves diagnosis support, streamlines communication, and fosters better health outcomes.

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