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Review on Multiple Disease Detection System

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A B S T R A C T

The "Multiple Disease Detection (skin cancer & others)" project merges cutting-edge technology with healthcare needs to create an innovative Java-based mobile application. By employing deep learning and machine learning, the app aims to detect diseases accurately through user-input symptoms, addressing early diagnosis challenges. It focuses on conditions like skin cancer, heart disease, diabetes, and Parkinson's disease, offering a comprehensive health assessment tool. Utilizing Convolutional Neural Networks (CNN) with datasets like HAM10000 enhances the app's ability to classify skin cancer effectively. Beyond disease identification, the app provides medication suggestions, enhancing its value as a holistic healthcare guide. Positioned at the crossroads of technology and health, this project reimagines medical diagnostics, empowering users to make informed decisions about their health .It epitomizes a visionary approach where innovation meets real-world healthcare demands, transforming the landscape of disease detection and management.

Keywords: : Machine Learning, Deep Learning, Disease Prediction, App Development, Java, Python, etc.

1. INTRODUCTION

The Earth is passing through a purplish patch of technology, where there is increasing demand for intelligence and accuracy behind it. Today's people are more likely to be addicted to the Internet, but they are not concerned about their personal health. In this 21st Century humans are surrounded with technology as they are the constituent of our day-to-day life cycle. With this we are always focusing on the health of ourselves and our earned valuables respectively. People avoid going to hospital for small problems which may become a major disease in future. Establishing question answer forums is becoming a simple way to answer those queries rather than browsing through the list of potentially relevant documents from the web. Our basic idea is to develop a system which will predict and give the details of the disease predicted along with its severity which as symptoms are given as input by the user. The system will compare the symptoms with the datasets provided in the database. If the symptom matches the datasets, then it should ask other relevant symptoms specifying the name of the symptom. If not, the symptom entered should be notified as wrong symptom. After this a prompt will come up asking whether you want to still save the symptom in the database. If you click on yes, it will be saved in the database, if not it will go to the recycle bin. The main feature will be the Deep learning, in which we are using CNN model to accurately predict the skin cancer form the given image of the patient's affected skin.

2. LITERATURE SURVEY

1. " Deep Convolution Neural Network based Automatic Multi-Class Classification of Skin Cancer from Dermoscopic Images" (2021) [1] The authors concluded that their proposed DCNN-based approach demonstrated high accuracy in classifying malignant skin cancer types from dermoscopic images. The results were promising and indicated the potential for practical applications in the medical field. The authors suggested that further implementation and validation through clinical trials could establish the approach as a reliable tool for assisting dermatologists in diagnosing skin cancer. Melanoma has been considered as the most fatal category of skin cancer. From past few decades, image processing has shown to be a boon in biomedical field where such cancerous diseases can be diagnosed well in time. Skin Cancer might not be the deadliest but it's necessary to detect it at its early stage in order to save lives of many. So finding a technique which gives high accuracy and early detection is very crucial. Enthusiastic results of image processing in medical field have convinced trained practitioners to rely on the outputs obtained from computer-vision system (CVS).

2. " Analysis and Classification of Skin Cancer Images using Convolutional Neural Network Approaches" (2020) [2] The paper concludes that the application of deep learning algorithms, particularly CNNs, can significantly improve the accuracy of skin cancer classification, which is crucial for medical diagnosis. The study acknowledges the computational time required for training the CNN models and suggests that further research could focus on optimizing training efficiency. In this modern era skin cancer is a serious problem around the globe and so it is the age of technology and it is important to solve this problem through intelligence machines which using different algorithms rather than conventional method. Intelligent machine using different

algorithms to classify the skin cancer images in a reliable way to save effort, time and ease human life. For this purpose, deep learning (CNN) algorithm is used by intelligent machine to classify the skin cancer images according to its types

3. " A Clinical support system for Prediction of Heart Disease using Machine Learning Techniques" (2020) [3] The authors concluded that the proposed clinical decision support system using machine learning algorithms could enhance the prediction of heart disease risk and help clinicians make more accurate diagnoses. While the accuracy decreased when using cross-validation, they believe it's a robust technique for handling overfitting. The study encourages further research to improve the accuracy of heart disease prediction models and highlights the importance of the choice of dataset, number of attributes, and algorithms used. Heart disease is a leading cause of death worldwide. However, it remains difficult for clinicians to predict heart disease as it is a complex and costly task. Hence, we proposed a clinical support system for predicting heart disease to help clinicians with diagnostic and make better decisions.

4. " Predictive Analytics on Diabetes Data using Machine Learning Techniques" (2021) [4] Precision medicine has gained attention for improving disease treatment and prevention. The research work contributes to the development of diabetes prediction models. Further integration of genetic biomarkers could enhance prediction accuracy and treatment decisions. Diabetes mellitus is an ongoing illness related with anomalous undeniable levels of the sugar glucose in the blood and it is a major public health problem. Diabetes has become the 4th driving reason for death in developed countries. Though several methodologies have been developed to predict this chronic disease, there is a need for innovative approaches which may aid in early prediction of diabetes and its complications.

5. " A Supervised Machine Learning Approach using Different Feature Selection Techniques on Voice Datasets for Prediction of Parkinson's Disease" (2019) [5] The study demonstrated the effectiveness of supervised machine learning and different feature selection techniques in distinguishing Parkinson's disease using voice data. SVM with GA-based features achieved high accuracy. However, further investigation with larger datasets and exploring other advanced classification algorithms could enhance accuracy and robustness. Future research can explore the integration of multimodal data (voice, gait, etc.) for improved accuracy. Among the neurological diseases, parkinson's disease is the second most common disease, which affect the old age people over the age of 65 year. It is also mentioned that the number of people affected with Parkinson's disease will increase at a higher rate until 2050, and it will be a rising concern to many developed countries because the cost due to the healthcare service of these disease is really high.

3. EXISTING SYSTEM

In the existing system the data set is typically small, for patients and diseases with specific conditions. These systems are mostly designed for the more colossal diseases such as Heart Disease, Cancer etc. The pre-selected characteristics may sometimes not satisfy the changes in the disease and its influencing factors which could lead to inaccuracy in results. As we live in a continuously evolving world, the symptoms of diseases also evolve over the course of time. Also, most of the current systems make the users wait for long periods by making them answer lengthy questionnaires.

4.PROPOSED SYSTEM

We are proposing such a system which will flaunt a simple and elegant User Interface and be time efficient. To make it less time-consuming we are aiming at a more specific questionnaire which will be followed by the system. Our aim with this system is to be connecting bridge between doctors and patients. The main feature will be machine learning, which will help us to get accurate predictions. Another feature that our system will comprise of is Doctor's Consultation. After delivering the results, our system will also suggest the user get doctor's consultation on this report. By using this feature, we will not only address the other class of users i.e., the Doctors but we will also gain their trust in this system as in that this system is not affecting their business

5.SYSTEM ARCHITECTURE

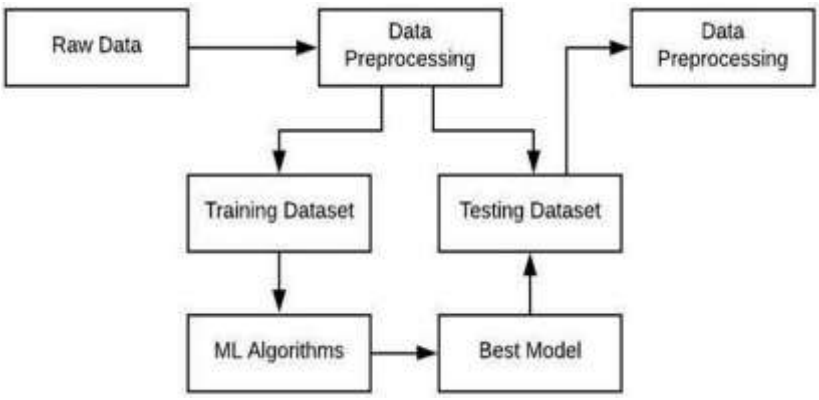

Fig.1 ML System Architecture

As shown in the above figure, the raw data from the original dataset is passed onto the first phase i.e., Data pre-processing. In Data pre-processing this raw data is then cleaned of all redundancies, missing values etc. The new clean data is fit for training different algorithmic models on it. The process of training models is fundamental process in Machine learning Projects. There are two approaches to machine learning mainly Supervised Learning and Unsupervised Learning. Our model mostly applies the first approach initially. i.e., Supervised Learning.

Now in Supervised Learning, the system is trained on some examples i.e., Training set and then the model is asked to predict new values based on the test set.

The partitioning of datasets becomes crucial for getting good accuracy in models. The percentage mostly used while partitioning is 80/20. i.e., 80% for training and 20% for testing purposes.

In our system we aim at first applying different algorithms on the training dataset and based on the model's Confidence and testing dataset accuracy, we select the best model algorithm and apply it on testing dataset to generate accurate results.

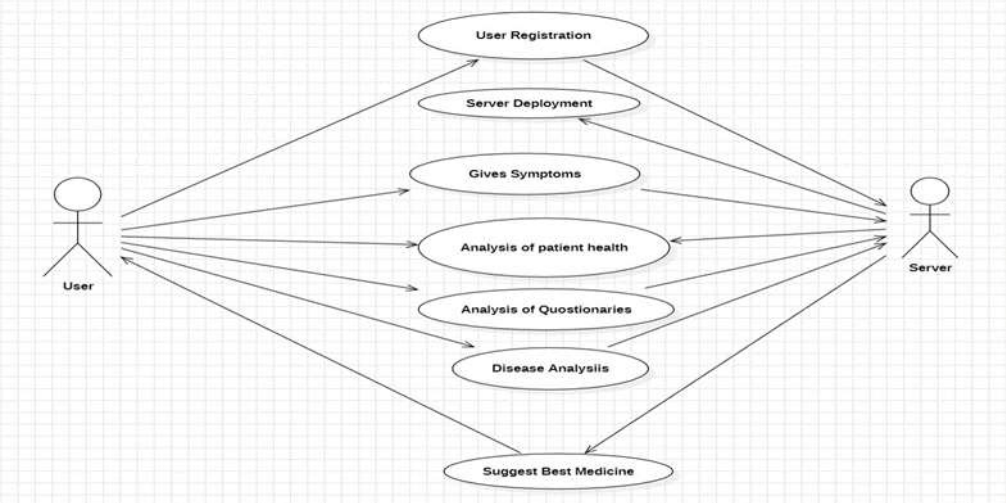

Fig.2 Use case Diagram of System

The above figure represents the use case diagram of our system, it has two actor's user and the server contains the ML model for predicting the disease, and firstly register to the system and then can be choose any one of the categories of diseases then he will give the input to the system an image or the answer to the questionaries, the it provided to the ML model for the prediction, ML model then predicts the results and the system then displays the predicted result and suggests the best drugs according the predicted disease

6.METHODOLOGY

Data Collection and Preprocessing: In the pursuit of accurate disease detection, the methodology employed in this project encompasses a multifaceted approach. The first critical step involved extensive data collection, where diverse datasets related to skin cancer, heart disease, diabetes, and Parkinson's disease were meticulously gathered. The primary dataset, HAM10000, served as the backbone for skin cancer classification. To ensure data reliability, rigorous preprocessing techniques were applied. This involved cleansing the datasets of noise, standardizing formats, and balancing class distributions. For skin cancer detection, the images from HAM10000 underwent preprocessing methods such as resizing, normalization, and augmentation, optimizing them for training the Convolutional Neural Networks (CNNs) effectively. This step was pivotal in enhancing the model's ability to discern subtle patterns indicative of various diseases.

Deep Learning Model Development: The core of our methodology revolved around the development of sophisticated deep learning models, specifically Convolutional Neural Networks (CNNs), tailored for disease detection. Leveraging the power of CNNs, which excel in image-based pattern recognition, our team designed and trained intricate neural architectures. The models underwent an iterative process of fine-tuning, employing techniques such as transfer learning and ensemble methods. Transfer learning allowed us to capitalize on pre-trained models, adapting them to our specific healthcare context, thus significantly reducing training time while preserving accuracy. Ensembles of multiple CNN architectures were created, amalgamating their individual strengths to create a robust, versatile disease detection framework. Rigorous validation and testing procedures were implemented to evaluate the models' performance, ensuring their effectiveness in accurately classifying diseases based on user-input symptoms.

User-Driven Interface and Holistic Healthcare Integration: Apart from the technical aspects, our methodology placed a strong emphasis on user experience and holistic healthcare integration. The Java-based mobile application was meticulously designed with an intuitive interface, ensuring ease of use for users from diverse backgrounds. The user-driven interface allowed seamless input of symptoms, enabling the app to provide precise disease predictions. Moreover, the application was augmented with a comprehensive database of medications, coupled with intelligent algorithms. These algorithms analyzed user data and provided tailored medication suggestions, transforming the app into a holistic

healthcare guide. This integration of disease prediction and medication recommendations offered users a one-stop solution, empowering them to proactively manage their health. The methodology, thus, not only focused on technological innovations but also on the seamless amalgamation of user-centric design and healthcare expertise, creating a transformative healthcare tool at the intersection of cutting-edge technology and real-world medical needs.

Continuous Learning and Ethical Considerations: An integral part of our methodology involved establishing a framework for continuous learning and ethical considerations. Recognizing the dynamic nature of healthcare, our models were designed to adapt and learn from new data, ensuring their relevance and accuracy over time. Regular updates and model retraining protocols were implemented, allowing the application to evolve alongside emerging medical research and diagnostic advancements. Additionally, ethical considerations were paramount throughout the project. Stringent privacy measures were integrated into the app, safeguarding user data and ensuring compliance with relevant healthcare regulations. Transparent and interpretable AI techniques were employed, enabling users to understand how the app arrived at specific predictions, fostering trust and user confidence. Ethical guidelines were followed rigorously, ensuring fairness, accountability, and transparency in both the development and deployment of the innovative Java-based mobile application. This continuous commitment to learning, ethical practices, and user trust underscores the comprehensive and responsible approach taken in redefining the landscape of disease detection and management.

7. CONCLUSION

In conclusion, the "Multiple Disease Detection (skin cancer & others)" project stands as a testament to the convergence of cutting-edge technology and healthcare expertise, redefining the way we approach disease detection and management. Through the innovative Java-based mobile application, empowered by deep learning and machine learning techniques, the project addresses the critical challenge of early diagnosis. By accurately detecting conditions like skin cancer, heart disease, diabetes, and Parkinson's disease based on user-input symptoms, the application not only provides a revolutionary tool for users but also represents a paradigm shift in medical diagnostics.

This transformative project not only excels in technical innovation but also embodies a user-centric approach. The intuitive interface ensures accessibility for all users, democratizing healthcare access. Moreover, the integration of medication suggestions adds a holistic dimension to the app, empowering users with comprehensive health insights. The methodology's emphasis on continuous learning and ethical considerations ensures the application's adaptability, reliability, and user trust in the long run.

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We are immensely grateful for the research institutions, healthcare professionals, and data scientists who generously shared their knowledge and datasets, making our research robust and comprehensive. The project owes its success to the collaborative spirit that exists within the scientific community, and we are honoured to have been a part of it.

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