Predicting Patient Data Like Heart Problems, Diabetes, Brain Tumor, And NLP Based for Drugs Suggestion Based On Cloud

[1]Prof. Vishal Shinde, [2]Mr. Prathamesh Sunil Sonawane, [3]Mr. Santosh LaxmanNarvekar, [4]Mr. Ajinkya Ashok Redekar.

[1]Asst.Professor,[2,3,4]UG Student,[1,2,3,4]Computer Engg. Dept. Shivajirao S. JondhleCollege of *Engineering & Technology, Asangaon, Maharashtra, India.*

[1]mailme.vishalshinde@gmail.com, [2]prathameshsonawane32@gmail.com, [3]narvekarsantosh946@gmail.com, [4]ajinkyaredekar531@gmail.com

Abstract: Early diagnosis of the disease is important for effective treatment and betterpatient outcomes. This work offers cloud-based multiple predictions using machinelearning algorithms. The system aims to predict three diseases: heart disease, diabetes, andbrain disease. Supervised machine learning has been developed to predict heart disease and diabetes. This model was studied on a large database of patients to identify patternsassociated with each disease. For brain tumor detection, deep learning models built with TensorFlow are used to analyze magnetic resonance imaging (MRI) scans. The system ispowered by a ReactJS frontend for user interaction and a Python backend for modelingand processing data. To ensure usability and accessibility, the entire project is hosted onthe Amazon Web Services (AWS) cloud platform. The project demonstrates the potential of machine learning for early detection of diseases. The aerial approach facilitates broader distribution and accessibility, potentially improving health and supporting immunity.[1]

Keywords: Brain tumor, Heart Disease, Diabetes prediction, Machine learning.

I.INTRODUCTION

The increasing prevalence of chronic illnesses necessitates advancements in early detection and diagnosis. This research uses device learning trends to demonstrate a cloud-based machine learning model or models for forecasting a few illnesses. The main objective is to predict the likelihood ofthree known conditions: diabetes, heart disease, and brain tumors. [1] Effective treatment and better patient outcomes depend heavily on early illness identification. It makes prompt intervention possible, which may stop the progression and consequences of the condition. Early identification can greatly improve treatment methods and quality of life in the case of chronic illnesses like diabetes and heart disease.[4] Increasing patient survival rates and choosing the best course of therapy for brain tumors depend on early detection.[7] A potent method for illness prediction is provided by machine learning (ML). The prediction models are built using machine learning algorithms, including Logistic regression for heart and diabetes prediction, and TensorFlow with Keras for Brain tumor detection. The application is deployed usingAWS Clouds for Python models and Google Clouds for React applications. ML models may find patterns and relationships in massive volumes of medical data that are frequently too complicated for conventional statistical techniques. Based on a patient's unique traits, these patterns can subsequently be utilized to forecast the likelihood of a given disease. [1]

II. AIMS AND OBJECTIVES

a) Aim:

The goal of this project is to create a cloud- based, easily navigable system for estimating the risk of heart disease, diabetes, and brain tumors—three major disorders. The system examines user data and offers insights into possible health issues by utilizing machine learning.

b) Objectives:

To create a deep learning model for brain tumor identification based on MRI image processing using TensorFlow. [7] Using patient data, develop supervised machine learning models to forecast diabetes and heart disease. To build a ReactJs User Interface (UI) that makes it simple for users to interact with the system.

III. LITERATURE SURVEY

 DOI : 10.35291/2454-9150.2024.0253

Paper 1: The Prediction of Disease Using Machine Learning

Focus: Machine learning for disease prediction in healthcare. Methods: Data mining algorithms like Decision Tree, and Naïve Bayes to analyze large patient databases and identify patterns related to diseases. Contribution: Developed an automated system for disease prediction using historical data. [5].

Paper 2: Effective Heart Disease Prediction Using Machine Learning Techniques

Focus Machine learning for heart disease prediction. Methods: Compared various algorithms like Random Forest, Decision Tree, XGBoost, and Multilayer Perceptron. Optimized model performance using hyperparameter tuning. Contribution: Proposed a model using k-mode clustering with promising accuracy (up to 87.28%) for heart diseaseprediction. [2]

Paper 3: Heart Disease Prediction Using Machine Learning

Focus Machine learning for heart disease prediction. Methods: Evaluated four classification algorithms: Multilayer Perceptron, Support Vector Machine, Random Forest, and Naïve Bayes. Contribution: Identified Support Vector Machine (SVM) as the best-performing model with an accuracy of 91.67% forheart disease prediction [3]

IV. COMPARATIVE STUDY

Table no. 1 Comparative Analysis

SRNO.	PAPERTITLE	AUTHOR (S)	METHOD	ADVANTAGE	DISADVANTAGE
1	Multiple Disease Prediction System UsingMachine Learning	Prof. DR. R. Srinivasa Rao, E. Bhargavi, D. Purnachandra Rao, B. Kanthi Kumar, D. Venkatesh	Supervised ML Algorithms (Logistic Regression, SVM)	handle enormous amounts of data inone place and increased speed of prediction.	Limited Scalabilityand Use Cases.
SRNO. 2	The Prediction of Disease Using Machine Learning	Dr. CK Gomathy,Mr.A Rohith Naidu	Decision Tree,Naive Bayes	Automates diseaseprediction improves healthcare decision-making	Limited to data availability and chosenalgorithms
3	Effective HeartDisease Prediction Using Machine Learning Techniques.	Chintan M. Bhatt, Parth Patel, TarangGhetia	Decision Tree, Random Forest, XGBoost,K-modes clustering,	High accuracy (up to 87.28%) in heart disease prediction	Requiresdata pre-processing and hyperpar ametertuning
4	Heart Disease PredictionUsing Machine Learning	Chaimaa Boukhate m, HebaYahia Youssef, AliBouNassif	Multilayer Perceptron, Support Vector Machine, Random Forest	Identifies SupportVector Machine (SVM) as a strongperformer (91.67% accuracy)	Performance may vary dependingon chosen algorithms and datasets

V. EXISTING SYSTEM

While there have been notable advancements in medicine under the current medical system, there are still numerous issues and constraints that this work aims to address. The importance for the desire of disease-based forecasts, such as heart, diabetes, and brain tumors must be understood in the context of the currentmedical system for patient data to recommend medications. [1]

1. Reactive Approach to Healthcare Traditionally healthcare has been based on a reactive approach, which is often a therapeutic intervention based on the patient's symptoms or the development of the disease. This approach often leads to delays in diagnosis and treatment, especially for chronic conditions such as heart disease, diabetes, and mental illness. Rapid diagnosis of these health problems is crucial for effective management and improved outcomes.
2. The system handles both structured data and unstructured data with the help of pre-processing. For that, the patient's previous history and patient disease details are collected. Collect the patient's previous history patient disease details, and medical reports as knowledge sets the preprocessing was done through victimization call tree regression to locate the missing values. The

 DOI : 10.35291/2454-9150.2024.0253

pre-processed knowledge set is employed for giving input to the projected model. The projected model relies on the factitious neural network (ANN). Once coached and tested, the system manufactures a confusion matrix for generating the accuracy of the model. Finally the model for disease prediction in the real world situation. Artificial neural networks (ANN) and stochastic gradient algorithmsare used for learning and doing the effective prediction of diseases. [10]

VI. PROBLEM STATEMENT

Build a cloud-based, user-friendly system that leverages machine learning models topredict the risk of three prevalent diseases: heart disease, diabetes, and brain tumors. This system should address the limitations of traditional disease detection methods by offering early insights based on user data analysis. [1]

VII. PROPOSED SYSTEM

In response to the existing challenges in healthcare, "Predicting patient data like heart problem, Diabetes, Brain tumor and NLP based for drugs suggestion based on cloud" presents a transformative solution that leverages cutting-edge technologies to enhance patient care, streamline healthcare delivery, and promote proactive health management. The proposed system is a comprehensive disease prediction project that utilizes machine learning algorithms, including Support Vector Machine (SVM), LogisticRegression, and TensorFlow with Keras, to predict multiple diseases such as diabetes, heart disease, and Brain tumor detection [1]

VIII. ALGORITHM

For Heart disease and Diabetesprediction:

Step 1: Start

Step 2: Import Libraries numpy (np), pandas

(pd),model_selection

sklearn.linear_model, sklearn.metrics

Step 3: Data Loading and SplittingFeatures and Target

X =

heart_data.drop(columns='target', axis=1)Y = heart_data['target']

Step 4: Splitting Data into Training andTesting Sets: train_test_split splits the features (X) and target (Y) intotraining and testing sets using a 20% test size (test_size=0.2).

Step 5: Model Training

Logistic regression () instantiates a Logistic Regression classifier. *model.fit(X_train, Y_train)* trains themodel using the training data (X_train,Y_train). The model learns therelationship between features and thetarget variable.

Step 6: Model Evaluation (Accuracy Score)Making Predictions: *X_train_prediction = model.*

predict(X_train) uses the trainedmodel to predict the target variable for the trainingdata.

X_test_prediction = model. predict(X_test) uses the trainedmodel topredict the target variable for the testing data.

Step 7: Testing various models and comparing scores to select the best model.

Step 8: Predicting final scores.

Step 9: End

for brain tumor detection:

Step 1: Start

Step 2 : Import Libraries

numpy (np), pandas (pd), keras.modelssequential, keras layers, TensorFlow

Step 3: Data Loading and SplittingFeatures and Target

Resize images to a fixed size (150x150)and add labels

X_train = [] Y_train = [] image_size = 150labels = ['glioma_tumor','meningioma_tumor','no _tumor','pituitary_tumor']for i in labels:

folderPath = os.path.join('../data/Training',i)

for j in os.listdir(folderPath):img = cv2.imread(os.path.join(folderPath,j))img = cv2.resize(img,(image_size,image_size)) X_train.append(img) Y_train.append(i)

Step 4: Splitting Data into Training andTesting Sets:

X_train = np.array(X_train)Y_train = np.array(Y_train)

Step 5: Model Training
X_train,X_test,y_train,y_test = train_test_split(X_train,Y_train,test_size =0.1,random_state=101)

Step 6: Plot Training Historymodel = sequential()

model <- Conv2D(32,(3,3),activation =

 DOI : 10.35291/2454-9150.2024.0253

'real',input_shape=(150,150,3)

model <- Conv2D(64,(3,3),activation='relu')model <- Dropout(0.3)

Step 7: Saving the model using thepickle.

Step 8: Predicting final scores.

Step 9: End

IX. MATHEMATICAL MODEL

Logistic Regression: Estimating Probabilities

Logistic regression is a widely used technique in machine learning and is especially useful for classifying data into two groups. Unlike linear regression, which predicts a constant value, logistic regression predicts the probability that the survey belongs to a particular category (i.e. whether it is spam or not). [8]

Sigmoid function:

The basis of logistic regression is the sigmoid function, also known as the logistic function. This S-shaped curve takes the linear combination of independent variables (X) and

transforms them into values between 0 and 1. Themathematical formula for the sigmoid function is:

$P(Y=1) = 1 / (1 + e ^ (-\beta_0 - \beta_1X_1 - \beta_2X_2$

$- ... - \beta_\square X_\square))$Here's a breakdown of theterms:

- P(Y=1): Probability of the dependent variable (Y) belonging to class 1 (positive class).
- e: Base of the natural logarithm (approximately2.71828).
- β_0: Intercept term (bias).
- $\beta_1, \beta_2, ..., \beta_\square$: Coefficients of the independentvariables ($X_1, X_2, ..., X_\square$).

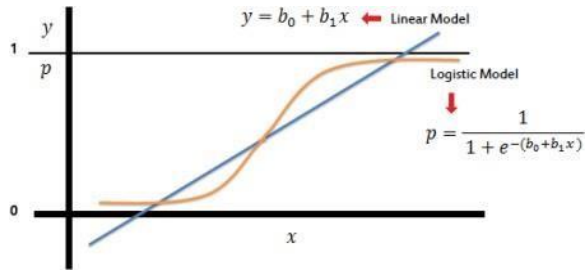

Fig 1. Logistic Regression sigmoid function

Building Blocks: Layers in a Sequential Model TensorFlow Keras provides a powerful tool for building neural networks: sequential models. This architecture is stacked on top of each other to form a linear array. Eachlayer performs a specific function on the data it receives.

Sigmoid probability function, in binary distribution problems (dividing data intotwo groups), the last layer in the sequential model usually uses the sigmoid function. This function is similar to the logistic function used in logistic regression. [9] The sigmoid function (seen as an S-shaped curve) plays an important role. It takes theweight of the material in the previous layerand converts it to a value between 0 and 1.The formula is as follows: *output 0= 1 / (1*

+ e ^ (-x))

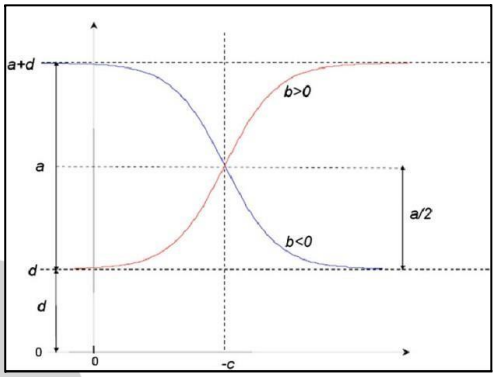

Fig 2. Logistic function used in Keras model

X. SYSTEM ARCHITECTURE

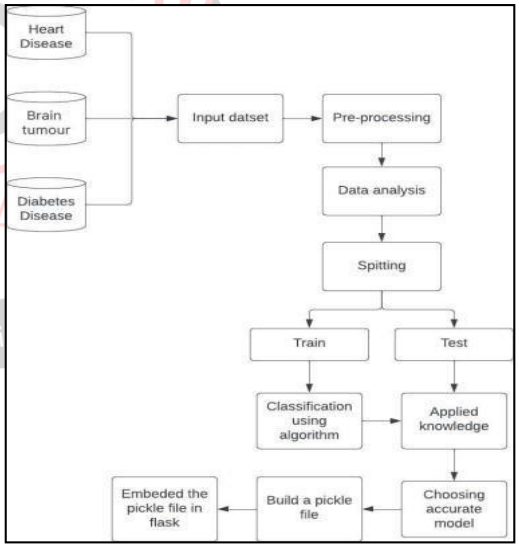

Fig 3. System Architecture

Use three models, for heart, diabetes, and brain tumors respectively, all models are pre-trained on the Training dataset gathered from the Kaggle site, and turn themodels into pickle files for ease of use of predictions. The models take medical datasets, the data goes through preprocessing stepsto clean and prepare itfor analysis and prediction.

XI. ADVANTAGES

Better treatment results: Early detection of health problems (heart disease, diabetes, brain cancer) allows for early intervention and treatment, and its cost-effective

 DOI : 10.35291/2454-9150.2024.0253

structure improves patient outcomes.

- **Reduce the burden on healthcare services:** Early diagnosis can help reduce the burden on healthcare services by managing health problems before they become serious again andrequire intensive care. [6]
- **Access to Healthcare:** Cloud solutions provide healthcare services, including expertise, to patients in remote areas without access to a private location. [6]
- **Personalized medicine:** Uses artificial intelligence, cloud computing, and predictive analytics to provide suggestions and recommendations from patient data to supportpersonalized treatment.
- **Cost Savings:** Early detection and personalized treatments can lead to cost savings in the long run by reducing hospitalizations, emergency room visits, and unnecessary procedures.

Additionally, cloud-based solutions offer scalability and cost-effectiveness compared totraditional on-premises infrastructure.

XII. DESIGN DETAILS

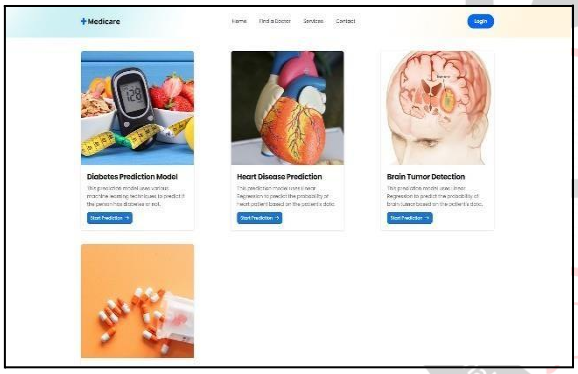

Fig 4. Website Dashboard

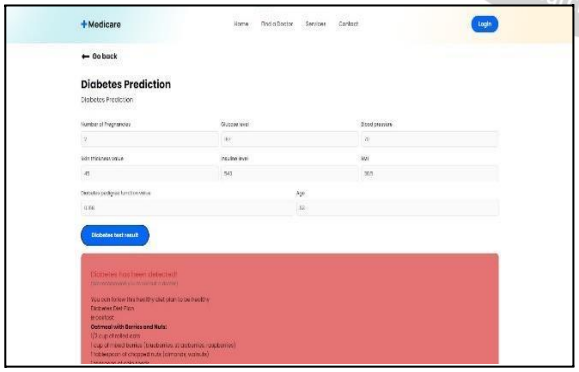

Fig 5. Heart disease prediction

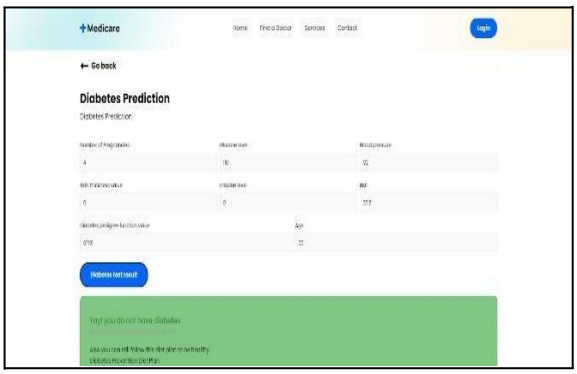

Fig 6. Diabetes prediction

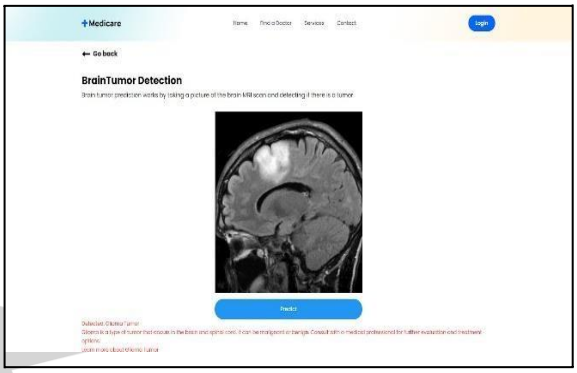

Fig 7. Brain tumor detection (Tumor detected)

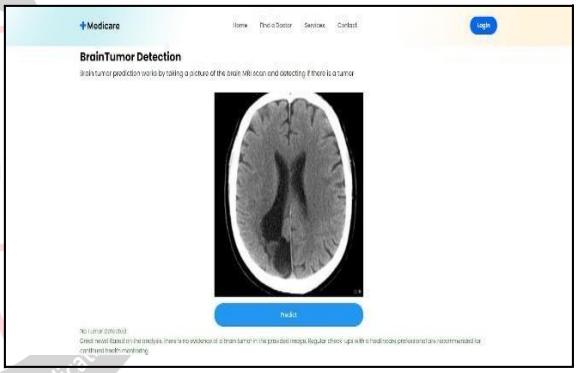

Fig 8. Brain tumor detection(NoTumordetected)

XIII. CONCLUSION

Thus we have tried to implement the paper "Multiple Disease Prediction System Using Machine Learning", "Prof. DR. R. Srinivasa Rao, E. Bhargavi, D. Purnachandra Rao, B. Kanthi Kumar, D. Venkatesh" IJNRD 2023 and according to the implementation the conclusion is asfollows, This project has used logistic regression and TensorFlow which solves existing accuracy problems as well as reduce death rates by chronic type diseases. After the detection of the disease, inform users how to prevent it. For future work, this project can implement this technique on some more chronic diseases with a rich dataset. Increasing the number of diseases and datasets used for the process canimprove the accuracy.

REFERENCE

[1] Prof. DR. R. Srinivasa Rao, E. Bhargavi, D.

 DOI : 10.35291/2454-9150.2024.0253

Purnachandra Rao,

B. Kanthi Kumar, D. Venkatesh “Multiple Disease Prediction System Using Machine Learning” IJRND (2023)

[2] Chintan M. Bhatt, Parth Patel, Tarang Ghetia “Effective Heart Disease Prediction Using Machine Learning Techniques”IEEE (2023)

[3] Chaimaa Boukhatem, Heba Yahia Youssef, Ali Bou Nassif “Heart Disease Prediction Using Machine Learning”IEEE (2022)

[4] Rayan Alanaz "Identification and Prediction of Chronic Diseases Using Machine Learning Approach" PMC (2022)

[5] Dr. C K Gomathy, Mr. A. Rohith Naidu “The Predictionof Disease Using Machine Learning” IJSREM (2021)

[6] Hafsa Habehh and Suril Gohel. "Machine Learning in Healthcare." PMC (2017).

[7] Hasan, A., Meziane, F., Aspin, R., & Jalab, H. “Segmentation of Brain Tumors in MRI Images” MDPI (2016).

[8] Clemma J Muller and Richard F MacLehose “Estimating predicted probabilities from logistic regression: different methods correspond to different target populations” International Jney of Epidemiology (2014)

[9] James, G., Witten, D., Hastie, T., & Tibshirani, R. “An Introduction to Statistical Learning” Springer (2013).

[10]Mr Satish Manje, Miss.RoshaniAdhikari, Miss.Shweta Jadhav, Mr.Ketan Mewati, Disease Prediction Based on Patient Treatment History" IJREAM (2020).

Vol-06

 DOI : 10.35291/2454-9150.2024.0253