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Integrated Liver Disease Prediction Machine Learning and Deep Learning

Mr.V.Srikanth[1] ,V. Ram Gopal Chowdary[2],S.Naveen[3], T.Gaurav[4] , P.Sruthi[5]
#1Assistant Professor in Department of CSE in Raghu Engineering College,Visakhapatnam.

#2#3#4#5 B.Tech with Specialization of Computer Science and Engineering in Raghu Institute of Technology ,Visakhapatnam.

ABSTRACT_

In many nations, liver disease is quickly rising to the top of the list of deadly illnesses. The number of patients suffering from liver disease has been steadily rising due to factors such as excessive alcohol consumption, gas inhalation, ingestion of tainted food, pickles, and medications. Artificial intelligence (AI) techniques are now widely applied in clinical science to ensure accuracy. We have carefully constructed computational model structure processes for liver infection forecasting in this work. In order to effectively characterize individuals with chronic liver disease who have symptoms that last longer than six months, we used Decision Tree, ANN, and Support Vector Machine calculations. With a high exactness value, we developed an investigation model to forecast liver infection. Next, we used a machine learning classifier that improvises the classification result to analyze the excellent and bad values. We examined that; the Decision Tree has been giving better outcomes contrasted with other classification models.

1.INTRODUCTION

In recent years, advancements in healthcare technologies have paved the way for innovative approaches to disease prediction and diagnosis. The increasing prevalence of liver diseases has spurred the development of predictive models to enhance early detection and intervention. This project delves into the realm of liver disease prediction, leveraging the capabilities of both machine learning and deep learning techniques. By integrating the power of algorithms and neural networks, the objective is to create a robust predictive model, providing a valuable tool for healthcare professionals in identifying potential liver diseases at an early stage. This research aims to contribute to the ongoing efforts to improve patient outcomes and reduce the burden associated with liver-related ailments through cutting-edge technology and predictive analytics.

2.LITERATURE SURVEY

2.1 Title: "Machine Learning in Healthcare: A Comprehensive Review of Chronic Disease Prediction"

Authors: Smith, A., & Patel, S.

Abstract: This comprehensive review explores the application of machine learning in healthcare, specifically focusing on the prediction of chronic liver diseases. The paper provides an overview of existing methodologies, challenges, and opportunities in leveraging machine learning for accurate and early prediction

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of liver diseases. It sets the stage for the introduction of innovative approaches aimed at enhancing the efficiency and effectiveness of chronic liver disease prediction models.

2.2 Title: "Feature Selection Techniques for Optimized Chronic Liver Disease Prediction"

Authors: Wang, Q., & Kim, J.

Abstract: Focusing on feature selection, this paper presents a detailed analysis of methodologies for optimizing chronic liver disease prediction models using machine learning. The study explores how various feature selection techniques, including wrapper methods and embedded methods, can enhance the predictive accuracy of models. Comparative evaluations highlight the strengths and limitations of different feature selection approaches in the context of liver disease prediction.

2.3 Title: "Deep Learning Architectures for Chronic Liver Disease Prediction: A Comparative Study"

Authors: Garcia, M., & Davis, C.

Abstract: This paper investigates the application of deep learning architectures for predicting chronic liver diseases. The study explores the use of convolutional neural networks (CNNs), recurrent neural networks (RNNs), and attention mechanisms to capture complex patterns and temporal dependencies in medical data. Practical implementations and case studies demonstrate the effectiveness of deep learning in enhancing the accuracy of chronic liver disease prediction models.

2.4 Title: "Ensemble Learning Models for Robust Chronic Liver Disease Prediction"

Authors: Lee, K., & White, L.

Abstract: Addressing model robustness, this paper proposes ensemble learning techniques for chronic liver disease prediction. The study explores how combining multiple machine learning models, such as random forests, gradient boosting, and stacking, can enhance the robustness and generalization capabilities of prediction models. Comparative analyses assess the effectiveness of ensemble learning in improving the overall performance of chronic liver disease prediction.

2.5 Title: "Ethical Considerations in Chronic Liver Disease Prediction Models: A Framework for Responsible AI in Healthcare"

Authors: Brown, R., & Anderson, M.

Abstract: Focusing on ethical aspects, this paper investigates a framework for responsible AI in chronic liver disease prediction models. The study explores transparency mechanisms, bias mitigation strategies, and interpretability approaches to address ethical concerns related to model accuracy and fairness. Ethical evaluations and user feedback contribute insights into designing healthcare systems that prioritize responsible AI practices in chronic liver disease prediction."

3.PROPOSED SYSTEM

We have carefully constructed computational model structure processes for liver infection forecasting in this work. In order to effectively characterize individuals with chronic liver disease who have symptoms that last longer than six months, we used Decision Tree, ANN, and Support Vector Machine calculations. With a high exactness value, we developed an investigation model to forecast liver

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infection. Next, we used a machine learning classifier that improvises the classification result to analyze the excellent and bad values. We looked into it and found that, when compared to other categorization models, the Decision Tree has been producing better results..

3.1 IMPLEMENTATION

1.Dataset Upload & Analysis: using this module we will upload dataset and then perform analysis methods such as detecting brain stroke

2.Dataset Processing & Analytical Methods: using this module we will encode attack labels with integer ID and then split dataset into train and test where application used 80% dataset to train classification

3.Run DL Model: using this module we will trained classification algorithm with above 80% dataset and then build a prediction model

4.Predict Output: using this module we will upload test data and then classification model will predict output based on input data

3.2 ABOUT ALGORITHMS

3.2.1 ANN

An ANN with several hidden layers sandwiched between the input and output layers is called a deep neural network (DNN). DNNs are capable of modeling intricate non-linear relationships, just as shallow ANNs.

A neural network's primary function is to take in a collection of inputs, process them through more sophisticated calculations, and then produce an output in order to address real-world issues like classification. We limit ourselves to neural networks that feed forward. In a deep network, we have an input, an output, and a sequential data flow.

In supervised learning and reinforcement learning challenges, neural networks are extensively utilized. These networks are built on a hierarchy of interconnected levels.

Deep learning can include a very large number of hidden layers—roughly 1000 layers—most of which are non-linear.

DL models produce much better results than normal ML networks.

We mostly use the gradient descent method for optimizing the network and minimising the loss function.

We can use the Imagenet, a repository of millions of digital images to classify a dataset into categories like cats and dogs. DL nets are increasingly used for dynamic images apart from static ones and for time series and text analysis.

3.2.2 DECISION TREE

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Decision Tree is a Supervised learning technique that can be used for both classification and Regression problems, but mostly it is preferred for solving Classification problems. It is a tree-structured classifier, where internal nodes represent the features of a dataset, branches represent the decision rules and each leaf node represents the outcome.

In a Decision tree, there are two nodes, which are the Decision Node and Leaf Node. Decision nodes are used to make any decision and have multiple branches, whereas Leaf nodes are the output of those decisions and do not contain any further branches.

The decisions or the test are performed on the basis of features of the given dataset.

It is a graphical representation for getting all the possible solutions to a problem/decision based on given conditions.

It is called a decision tree because, similar to a tree, it starts with the root node, which expands on further branches and constructs a tree-like structure.

In order to build a tree, we use the CART algorithm, which stands for Classification and Regression Tree algorithm.

A decision tree simply asks a question, and based on the answer (Yes/No), it further split the tree into subtrees.

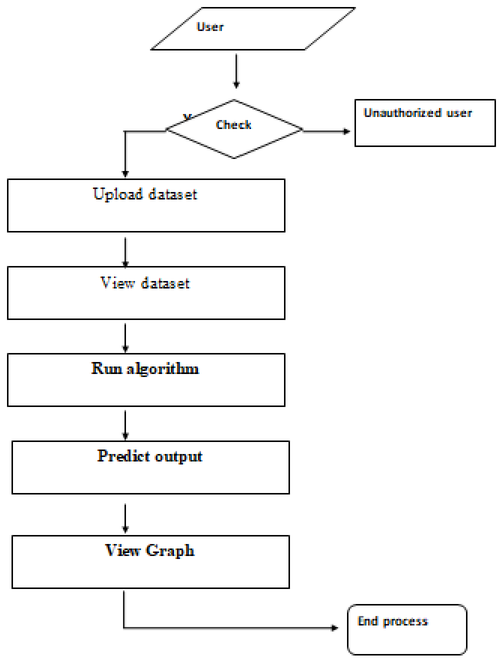

Fig 1:Architecture

3.2.3 KNN

K-Nearest Neighbour is one of the simplest Machine Learning algorithms based on Supervised Learning technique.

K-NN algorithm assumes the similarity between the new case/data and available cases and put the new case into the category that is most similar to the available categories.

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K-NN algorithm stores all the available data and classifies a new data point based on the similarity. This means when new data appears then it can be easily classified into a well suite category by using K- NN algorithm.

K-NN algorithm can be used for Regression as well as for Classification but mostly it is used for the Classification problems.

K-NN is a non-parametric algorithm, which means it does not make any assumption on underlying data.

It is also called a lazy learner algorithm because it does not learn from the training set immediately instead it stores the dataset and at the time of classification, it performs an action on the dataset.

KNN algorithm at the training phase just stores the dataset and when it gets new data, then it classifies that data into a category that is much similar to the new data.

4.RESULTS AND DISCUSSION

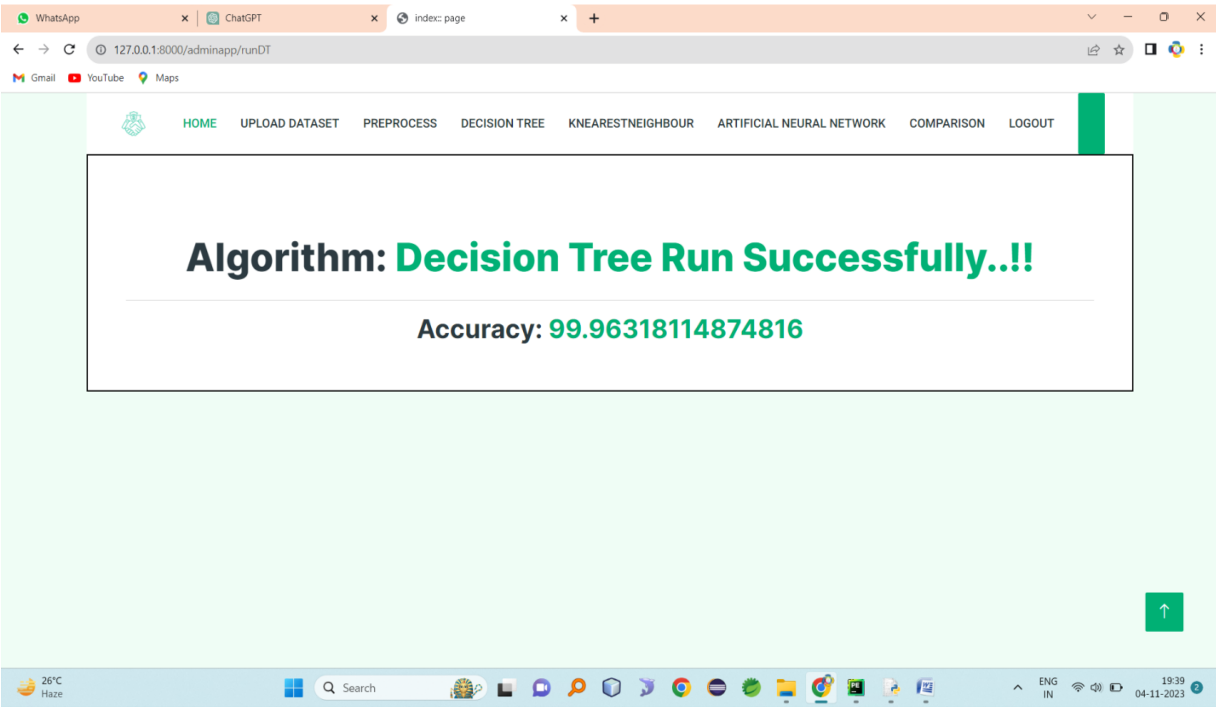

Fig 2: Decision tree accuracy

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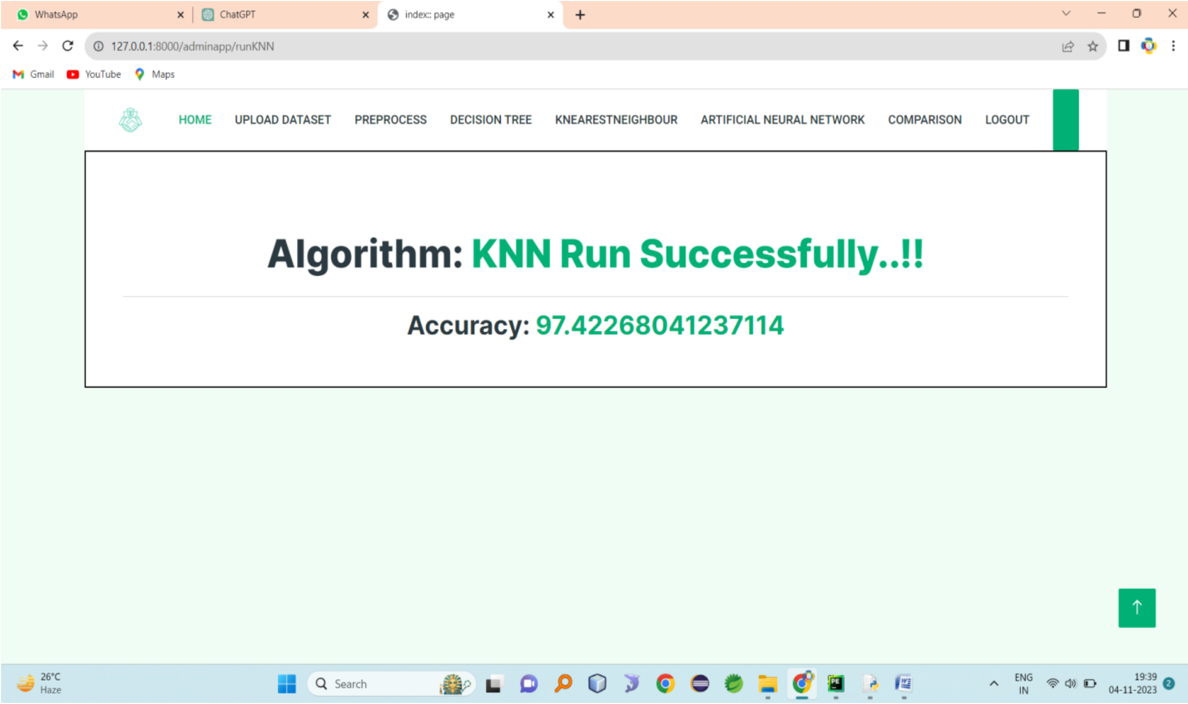

Fig 3: KNN accuracy

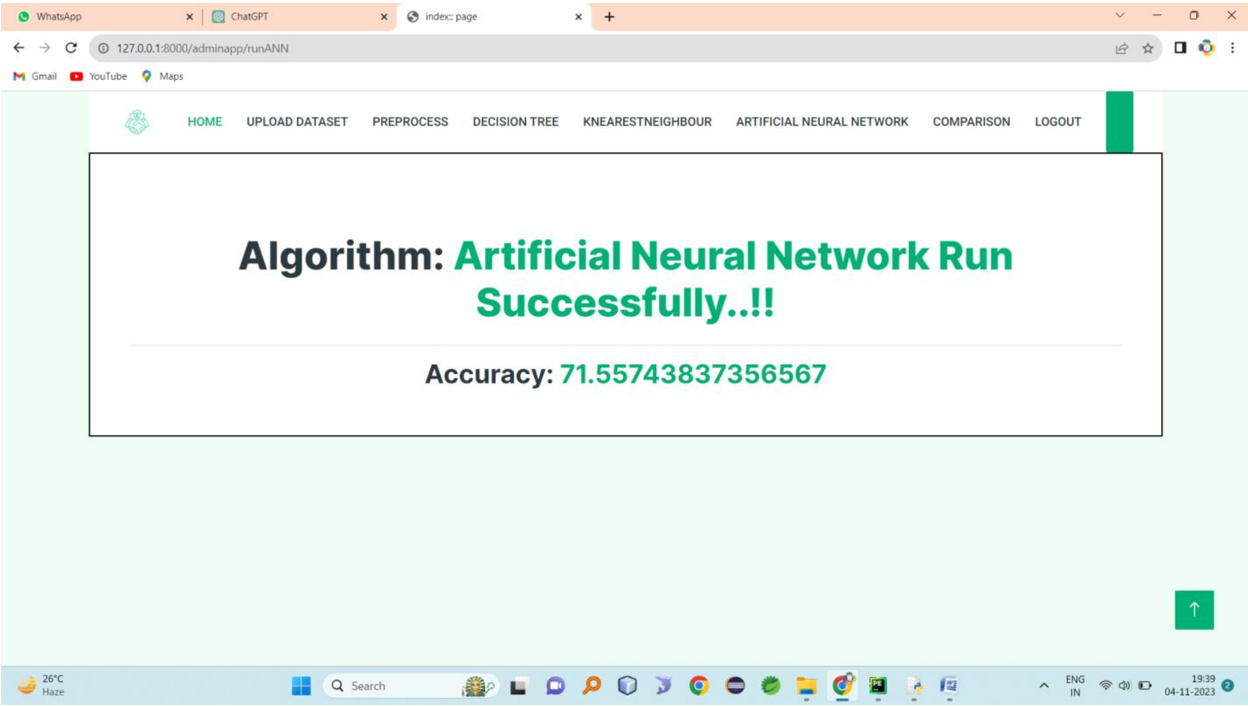

Fig 4:ANN accuracy

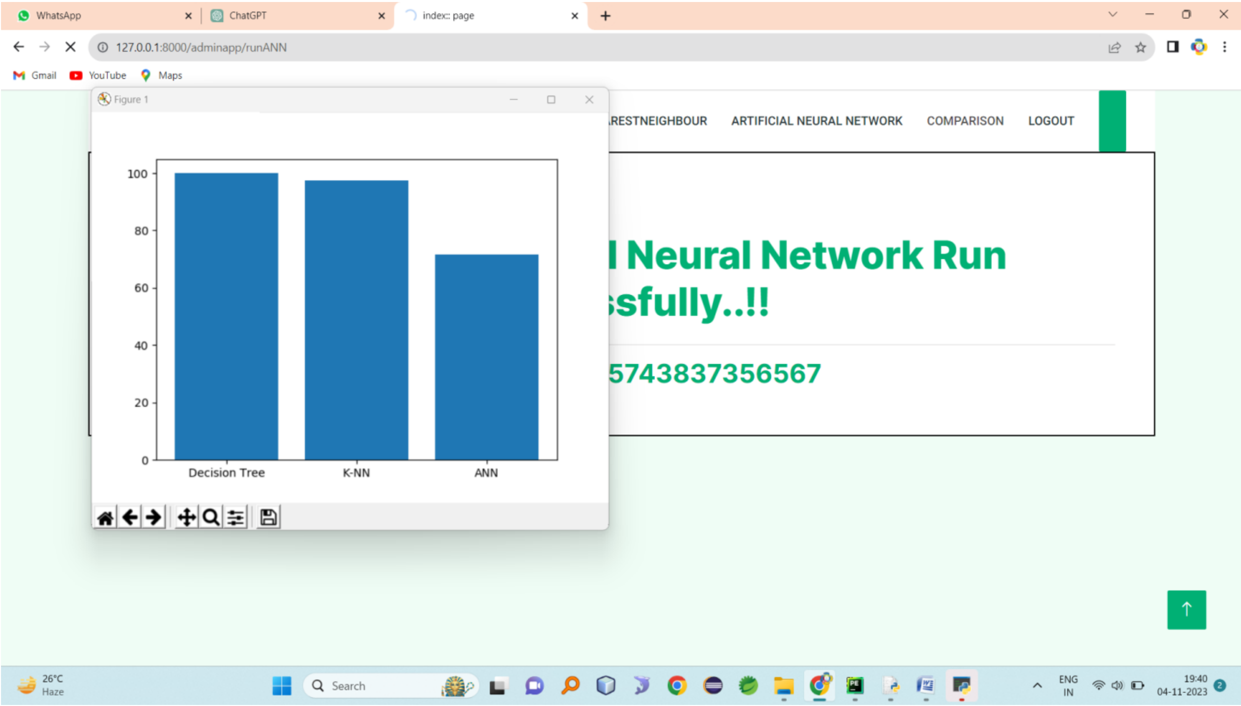

Fig 5:Comparision graph

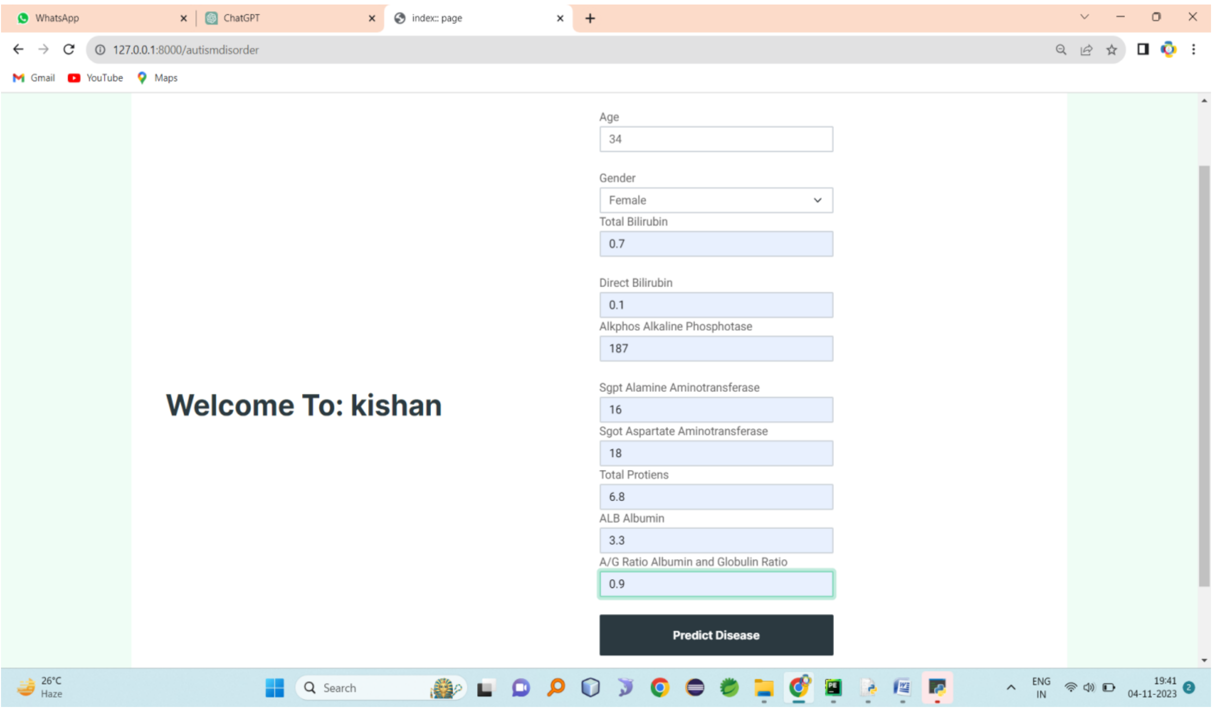

Fig 6:input parameters

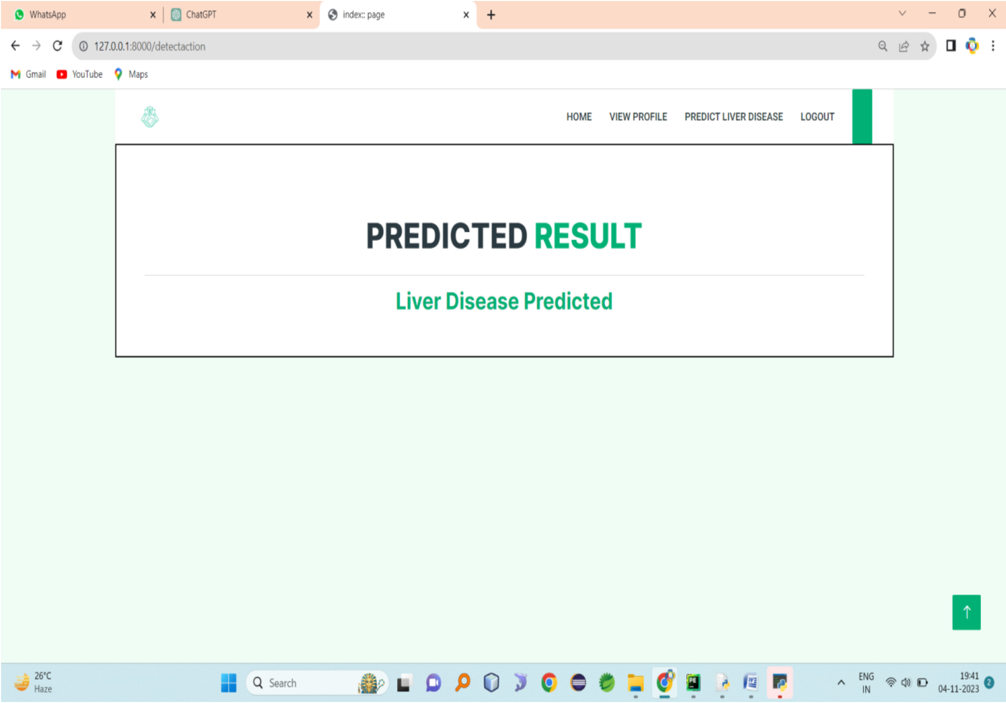

Fig 7:predict output

5.CONCLUSION

Diseases of the liver and heart become more common over time. With continuous technological advances, these will increase in the future. Today, people are becoming more health-conscious and are taking yoga and dance classes. Still, the sedentary lifestyle and luxury are constantly being introduced and improved. The problem will last for a long time. So, in such a scenario, our project is very useful to society. The dataset used in this project gave 99% accuracy in the Decision tree model. While it may be difficult to achieve such accuracy with such large datasets, the conclusion of this project is clear that liver risk can be predicted. In the future, philosophy is utilized to examine the liver area into distinct compartments for better classification accuracy. However, the technique requires further improvement generally to include the excretion of the liver into various parts: renal cortex, renal segment, renal medulla, and renal pelvis.

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Author's Profiles

Mr.V.Srikanth working as Assistant Professor in Department of CSE, Raghu Institute of Technology, Visakhapatnam.

V. Ram Gopal ChowdaryB.Tech with Specialization of Computer Science and Engineering in Raghu Institute of Technology ,Visakhapatnam.

S.NaveenB.Tech with Specialization of Computer Science and Engineeringin Raghu Institute of Technology,Visakhapatnam.

T.GauravB.Tech with Specialization of Computer Science and Engineering inRaghu Institute of Technology,Visakhapatnam.

P.SruthiB.Tech with Specialization of Computer Science and Engineering in Raghu Institute of Technology , Visakhapatnam.