Disease Detection System

Deep Suchak[1], Divya Jain[1], Mokshesh Vora[1], Pranav Saraf , Prisha Singhania , Pranali Kurani , Aarti Ambekar[2]
[1] U. G. Student, Department of Electronics and Telecommunication, D.J.Sanghvi College of Engineering, Vile Parle (W), Mumbai-400056.
Assistant Professor, Electronics and Telecommunication Department D.J.Sanghvi College of Engineering, Vile Parle (W), Mumbai-400056
E-mail: [1]suchakdeep@gmail.com, [1]mehtadivya1612@gmail.com, [1]moksheshvora@gmail.com, pranavsaraf422@gmail.com, prishadsinghania@gmail.com, pranalikurani12@gmail.com, [2]aarti.ambekar@djsce.ac.in

***Abstract*— Human healthcare is one of the most fascinating topics of our day. It is seeking the greatest and most thorough disease diagnosis in order to receive the therapy it requires as soon as feasible. Other professions, such as statistics and computer science, are required for the health element, which is frequently very helpful in providing a general picture of disorders and their diagnosis while avoiding some specific parts. We recommend a detailed structured analysis of human diseases related to machine learning at the end. Machine learning can give a notable influence on the patient's healthcare delivery strategies. For example, machine learning can help a clinician to actually point out the disease, diagnose it and treat it. Some of the uses of machine learning in healthcare can also streamline healthcare processes and prepare surgery planning, execution. This study focuses on current updates to methodologies that deal with machine learning extension applied to the prediction of human disease in the medical area in order to discover new intriguing trends, conduct significant diagnoses of the disease and aid in planning of the treatment. To provide proper decision assistance, this project studies and installs distinct machine learning algorithms utilized in healthcare applications.**

Keywords: Disease diagnosis, Machine learning, Health Care, Application.

I. INTRODUCTION

According to World Health Organization reports, there is only one physician available for every 1000 people. In the medical healthcare industry, India's healthcare system is experiencing a severe lack of physicians and clinicians. The COVID-19 epidemic exacerbates this scarcity of health-care resources, putting even more strain on an already overburdened system. Having said that, it is critical that individuals have a different way of examining their health and getting a rough diagnosis of the ailment they may be suffering from based on their own symptoms before contacting a physician. This software fills that gap by utilising Machine Learning to give users with fast and accurate medical diagnosis based on their symptoms and health indicators. This platform encourages early illness diagnosis, giving doctors more time to intervene and prevent sickness. At the conclusion, we give a systematic assessment of machine learning applications for illness detection. The paper focuses on new methods to machine learning's progress in illness detection, as well as new fascinating strategies for making insignificant diagnoses and planning effective treatment. Machine learning is widely employed in a variety of sectors, including academia and medicine, and it plays a vital role in human healthcare. For the massive volumes of data created by the healthcare industry, patterns are recognised and forecasts are formed. Images, patient data, and other types of information can be included in this data. With the constant advancement and evolution of technology, machine learning has become increasingly important in the healthcare sector. Improved computer power and the availability of datasets on open-source repositories have further aided the widespread use of machine learning. Cancer, heart disease, malaria, pneumonia, and diabetes are the five major illnesses that will be discussed in this study. The data is entered into a web app, and the analysis is done in a real-time database with a machine learning model that has been trained on the same dataset. Finally, the app displays the illness diagnosis findings. Using the logic regression approach, the predictions may be simply obtained. Early detection can help to avoid many illnesses. The proposed technique, according to a comparative analysis, can aid doctors in prescription timely medications for therapy. Machine learning is used in healthcare to tackle a range of problems. Take for example, heart disease,it affects people in different ways, and the severity of heart disease differs from one individual to the next. As a consequence, building a machine learning model, training it on a dataset, and including specific patient data can help predict outcomes. The prediction outcome will be unique to that person since it will be based on the information supplied. This may be summarised by noting that machine learning algorithms can now be used to forecast all of these illnesses.

II. OBJECTIVE

Medical wellness is one of the most fascinating topics of our day. It is seeking the greatest and most thorough disease diagnosis in order to receive the therapy it requires as soon as feasible. Other professions, such as statistics and computer science, are required for the health sector, which is frequently digitised due to the difficulty of recognition. The objective of the new techniques is to push these disciplines beyond their traditional boundaries. The vast array of new approaches aids in presenting a comprehensive picture of illnesses and their diagnosis, but it also avoids some specific elements. At the conclusion, we suggest a fully structured analysis of human illnesses connected to machine learning. For example, machine learning may assist a doctor in identifying, diagnosing, and treating an illness. Machine learning may also be used in healthcare to simplify procedures and prepare operation planning and execution. This research focuses on the most recent improvements to approaches that deal with machine learning extension applied to the prediction of human

disease in the medical field in order to uncover new fascinating patterns, perform important disease diagnostics, and help in treatment planning. To provide proper decision assistance, this project studies and instals distinct machine learning algorithms utilised in healthcare domains.

IV. PROPOSED DESIGN

The primary parts engaged in this project, according to the project specifications, are:

1. Create a Flask application
2. Using the dataset to train on a variety of illnesses
3. Creating a prediction machine learning model
4. Incorporating the model into our app
5. Heroku cloud deployment of the codebase
6. Creating a graphical user interface (GUI) for the programme to run smoothly and efficiently.

By completing these components of the project, we will be able to create a web application that takes patient information as input and predicts if the user is infected with the disease using machine learning models.

III. IMPLEMENTATION

In our model, to detect heart disease we follow a simple action plan. We gather the data and load our dataset in the notebook,then we preprocess the data and perform data cleaning inorder to get rid of outliers and have maximum efficiency to detect any form of disease. We have used the disease dataset available with around 30 parameters for cancer, about 10 parameters for diabetes and heart disease, and 7 parameters for kidney and liver. Apart from these we also have implemented deep learning for our malaria and pneumonia disease classification. The accuracy of our model with respect to different diseases is different but upon testing we are rest assured that they are efficacious. When the user clicks on the website, a welcome page is encountered wherein the user gets a glance about the page, thereafter the user is shown tabs of disease to choose upon which he wants to verify as per his report. Except for malaria and pneumonia, the user needs to enter in the parameters of the report and in case of malaria and pneumonia, the user needs to put the cell image, in order to check whether they have that corresponding disease or not.

Health detection

Disease detection is useful for identifying a person's Health. Logistic Regression is used to detect parameters in the training dataset, and Jupyter Notebook is used to implement it. The different parameters were scaled to get optimum results , a minimum of 90% accuracy were obtain in all the selected disease

Feature Extraction

The feature is chosen. In a pattern classification task, the vector is the most significant component. Feature Engineering is an important component of a data science model development pipeline. holds true for the number of instances but not for the number of features.

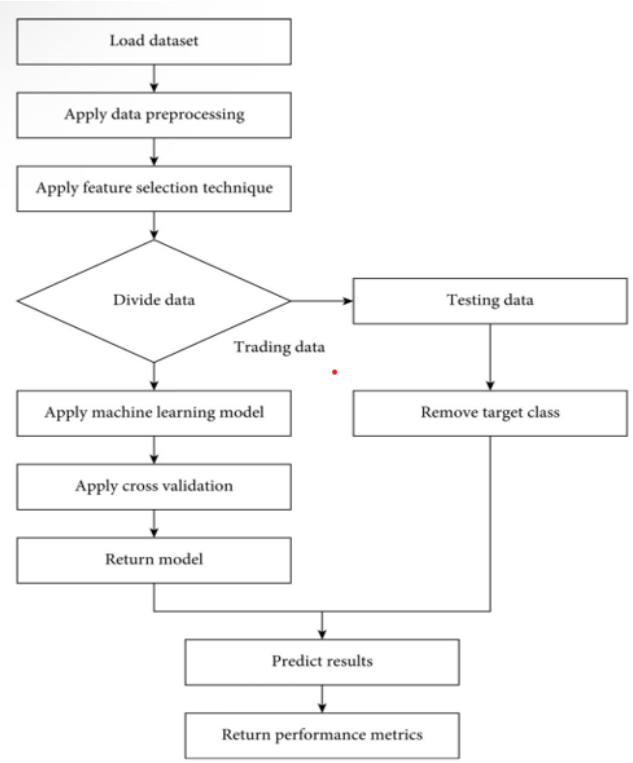

Fig.1 *Flowchart of the workflow*

Feature Extraction

The feature is chosen. In a pattern classification task, the vector is the most significant component. Feature Engineering is an important component of a data science model development pipeline. holds true for the number of instances but not for the number of features.

Artificial Neural Network

Artificial neural networks (ANNs), often called neural networks (NNs), are computing systems that are designed to match the biological neural networks rooted in animal brains. The weights of neurons and edges are routinely changed as learning advances. The signal power at a connection is increased or reduced by the weight. In a manner that computers cannot, human brains interpret the context of real-world situations. To overcome this problem, neural networks were first developed in the 1950s. An artificial neural network attempts to replicate the network of neurons that make up the human brain so that the computer may learn and make decisions in a humanlike manner. ANNs are made by programming ordinary computers to act as though they were interconnected brain cells. To make sense of the data provided to them, artificial neural networks employ many layers of mathematical computation. An artificial neural network typically consists of hundreds to millions of artificial neurons (called units) stacked in layers. The input layer gets data from the outside world in many formats. This is the information that the network intends to process or learn. The data is routed through one or more hidden units after leaving the input unit. The job of the hidden unit is to convert the input into something that the output unit can use.

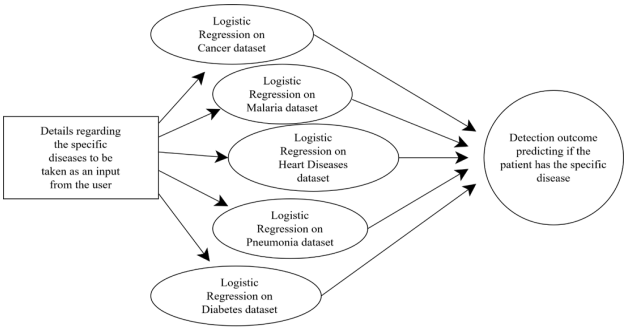

Fig.2 System Diagram

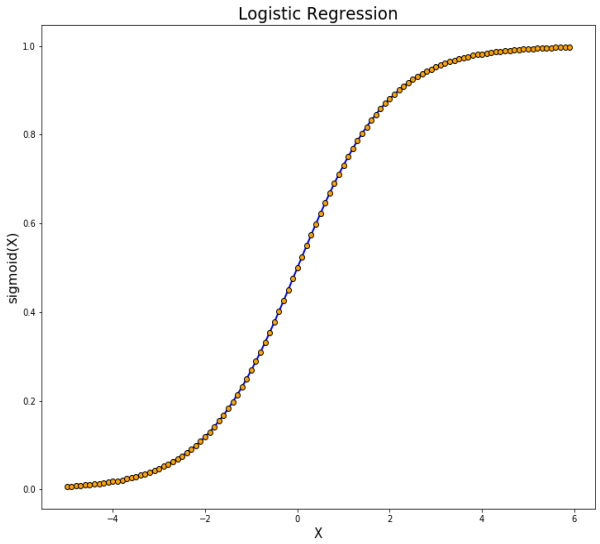

Fig.3 Logistic Regression

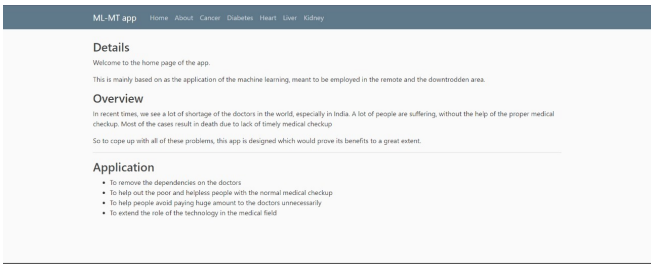

Fig.4 *Home Page*

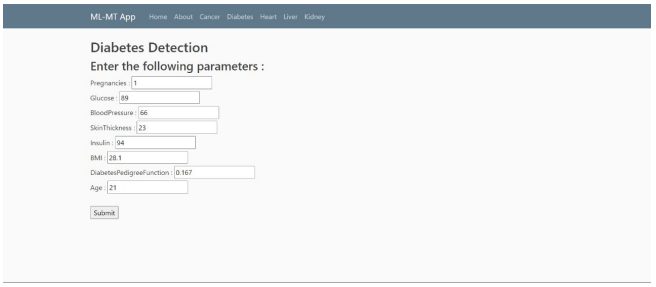

Fig.5 *Parameter Page*

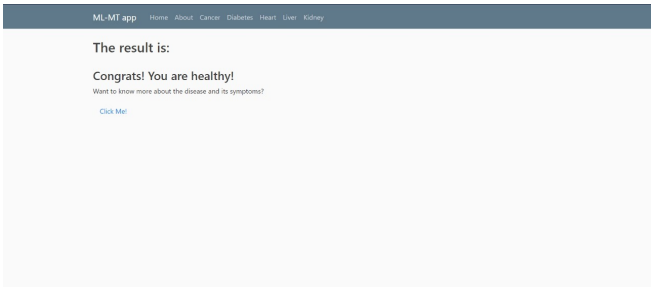

Fig.6 *Results Page*

V. RESULTS AND CONCLUSION

This study used a variety of ANN and CNN algorithms to predict a person's real-time expression. The model has a 90% accuracy rate and can generate predictions with only a few parameters. However, in order to increase the model's accuracy, research is being done to incorporate subjective features such as parameters and computer vision into the model. The purpose of this research is to increase accuracy by using external factors. This is critical for those who are having difficulty understanding their health, as well as those who wish to analyze symptoms as part of their health treatment. Detecting patients as soon as possible and providing appropriate treatment in the lowest amount of time possible.In recent decades, the method of discovering fascinating patterns in datasets has been employed to achieve this identification. This research examines intelligent data analysis approaches in the medical industry in depth. The following is an example of an experimental demonstration:

Seven different diseases from various datasets were examined in this experiment. The below is our website interface

VI. FUTURE SCOPE

Machine Learning's future in healthcare is still being researched. It can significantly aid in the treatment of ailments. It has the potential to be extremely cost-effective and efficient in the future. Machine Learning is being used in many studies to treat cancer, heart disease, and other illnesses. In the medical profession, machine learning will not totally replace humans. It will, however, be extremely useful in detecting and treating disorders. It has a lot of potential in hospitals. It's possible that we'll see it implemented in the future. Machine learning is now being used to assist hospitals optimize administrative operations, map and treat infectious diseases, and tailor medical treatments. It has the potential to improve hospital and health-care system efficiency while lowering the value of care. Future scope for this project involves standardizing parameters so that a single set of inputs can successfully detect if there’s a possibility of any disease. We could also include various diseases and increase the effectiveness of the system. Another improvement could involve using deep learning to detect x-rays and sonographies. The project could also extend its scope and suggest to the user some local physicians nearby using GPS and location filtering techniques, based on rating, if there’s a detection of any disease.

.

IX. REFERENCES

[1] A.D. Sunny, S. Kulshreshtha, S. Singh, Ba M. Srinabh, H. Sarojadevi, Disease diagnosis system by exploring machine learning algorithms. Int. J. Innov. Eng. Technol. (IJIET) (2018)

[2] S. Razia, P. Swathi Prathyusha, N. Vamsi Krishnan, S. Sumana, A review on disease diagnosis using machine learning techniques. Int. J. Pure Appl. Math. (2017)

[3] D. Pavithra, A.N. Jayanthi, A study on machine learning algorithm in medical diagnosis. Int. J. Adv. Res. Comput. Sci. (2018)

[4] M. Fatima, M. Pasha, Survey of machine learning algorithms for disease diagnostic. J. Intell. Learn. Syst. Appl. (2017)

[5] K.-M. Chen, D. Misra, H. Wang, H.-R. Chuang and E. Postow, " An \$X\$ -band microwave life-detection system ", *IEEE Trans. Biomed. Eng.*, vol. BME-33, no. 7, pp. 697-701, Jul. 1986.

[6] J. C. Lin, "Microwave sensing of physiological movement and volume change—A review", *Bioelectromagnetics*, vol. 13, pp. 557-565, 1992.

[7] P. K. Capp, P. L. Pearl and D. Lewin, "Pediatric sleep disorders", *Primary Care*, vol. 32, pp. 549-562, Jun. 2005.

[8] N. Hafner, I. Mostafanezhad, V. M. Lubecke, O. Boric-Lubecke and A. Host-Madsen, "Non-contact cardiopulmonary sensing with a baby monitor", *29th Annu. IEEE Int. Eng. Med. Biol. Soc. Conf.*, pp. 2300-2302, 2007.

[9] A. Singh, N. Hafner, M. Butler and V. M. Lubecke, "A data efficient method for characterization of chameleon tongue motion using Doppler radar", *Annu. IEEE Int. Eng. Med. Biol. Soc. Conf.*, pp. 574-577, 2012.

[10] X. Zhao, C. Y. Song, V. Lubecke and O. Boric-Lubecke, "DC coupled Doppler radar physiological monitor", *Annu. IEEE Int. Eng. Med. Biol. Soc. Conf.*, pp. 1909-1912, 2011.

[11] R. Fletcher and H. Jing, "Low-cost differential front-end for Doppler radar vital sign monitoring", *IEEE MTT-S Int. Microw. Symp. Dig.*, pp. 1325-1328, 2009.

[12] A. Singh and V. Lubecke, "A heterodyne receiver for harmonic Doppler radar cardiopulmonary monitoring with body-worn passive RF tags", *IEEE MTT-S Int. Microw. Symp. Dig.*, pp. 1600-1603, 2010